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**DEFINING THE INDEFINITE:
IMPROVISATION, TACIT KNOWLEDGE AND
PERCEPTION**

by

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degree of Doctor of Philosophy in Business and Management

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Table of Contents

<i>List of Tables</i>	4
<i>List of Figures</i>	5
ACKNOWLEDGEMENTS	7
ABSTRACT	10
CHAPTER 1: INTRODUCTION	11
1.1. <i>Research Background</i>	11
1.2 <i>Organizational Improvisation in Organization Theory</i>	13
1.3. <i>Purpose and Contributions of the Study</i>	14
1.4 <i>Structure of the Study</i>	16
CHAPTER 2:IMPROVISATION - A CRITICAL REVIEW OF THE LITERATURE	19
2.1 <i>Introduction</i>	19
2.1.1 Literature Review Methodology	22
2.2 <i>The Metaphor Perspective</i>	22
2.2.1 Jazz metaphor	24
2.2.2 Improvisational Theatre Metaphor	27
2.2.3 Other Metaphors: Indian Music, Music Therapy, Computer Platforms and Real time foresight	30
2.2.4 Critique of the Metaphor Perspective	33
2.3 <i>The Cognitivist Perspective</i>	35
2.3.1 The Organizational Memory Approach	38
2.3.2 The Sensemaking Approach	42
2.3.3 Critique of the Cognitivist Perspective	46
2.4 <i>The Sociomaterial Perspective</i>	53
2.4.1 Critique of the Sociomaterial Perspective	58
2.5 <i>Discussion</i>	60
2.5.1 The Separability Controversy.	61
2.5.2 The Outcome/Process Controversy	65
2.5.3 The Functionalist Controversy.....	70
2.6 <i>Implications and Tacit Knowledge as the Way Forward</i>	71
2.7 <i>Summary</i>	74
CHAPTER 3: INSIDE PERCEPTION AND IMPROVISATION	76
3.1 <i>Introduction</i>	76
3.2 <i>Approaches to Tacit Knowledge in Relation to Improvisation</i>	78
3.3 <i>Tacit Knowledge as Indwelling: The Basis of Significance and Action</i>	84
3.4 <i>The Pre-Requisites for Indwelling: Educating Perception through Experience</i> .	89

3.4.1 Participation in Practice	90
3.4.2 Becoming a Skilled Performer of a Practice	103
3.5 <i>Affordances and Meaning</i>	110
3.6 <i>Discussion: Conceptualizing Improvisation from Within</i>	114
3.7 <i>Refinement of the Research Question</i>	116
3.8 <i>Summary</i>	117
CHAPTER 4: RESEARCH METHODS	119
4.1 <i>Introduction</i>	119
4.2 <i>Research Design</i>	119
4.2.1 Quantitative Versus Qualitative Designs	120
4.2.2 Opting for Ethnography	124
4.3 <i>Research Setting</i>	125
4.5 <i>Data Collection Process</i>	128
4.6 <i>Data Analysis</i>	134
4.7 <i>Ethics</i>	141
4.8 <i>Trustworthiness</i>	142
CHAPTER 5: AIR TRAFFIC CONTROL AND IMPROVISATION AT A EUROPEAN INTERNATIONAL AIRPORT: EMPIRICAL FINDINGS	145
5.1 <i>Introduction</i>	145
5.2 <i>Background Information</i>	146
5.2.1 General Information.....	146
5.2.2 Personnel Information.....	147
5.2.3 Layout of Control Tower.....	149
5.3 <i>Structure of the Findings</i>	152
5.4 <i>Indwelling and Anticipation</i>	155
5.4.1 Relating Anticipation and Indwelling.....	155
5.4.2 Indwelling and Anticipation as the basis of Mundane Improvisation.	163
5.4.3 Indwelling and Anticipation as the basis of Critical Improvisation.	169
5.4.4 Summary	177
5.5 <i>Concern</i>	178
5.5.1 <i>Summary</i>	184
5.6 <i>Reflection in Response to Breakdowns - The Collapse and Restoration of Anticipation</i>	185
5.6.1 <i>Summary</i>	195
5.7 <i>Appraisal, Solicitations and Circumspection</i>	195
5.7.1 Appraisal and Solicitations	196
5.7.2 Circumspection.....	202
5.7.3 Illustration of Appraisal, Solicitations and Circumspections in Episodes 2 & 3.....	207
5.7.4 Summary.....	210

5.8 <i>Practices of Improvisation</i>	211
5.8.1 Introduction of New Elements	212
5.8.2 Role Change	214
5.8.3 Disregard	216
5.8.4 Timing Adjustment	218
5.9 <i>Findings Summary</i>	219
CHAPTER 6: DISCUSSION TOWARDS A NEW THEORY OF IMPROVISATION AND BEYOND	221
6.1 <i>Introduction</i>	221
6.2 <i>Summary of the Study</i>	221
6.3 <i>Theoretical Contributions to Organizational Improvisation</i>	222
6.3.1 Circumspection	225
6.3.2 Indwelling	226
6.3.3 Anticipation	227
6.3.4 Concern and Appraisal	231
6.3.5 Solicitations	236
6.3.6 Reflection in Response to Breakdowns	237
6.3.7 Improvisation Practices	238
6.3.8 Summary of Theoretical Implications for Organizational Improvisation	242
6.4 <i>Implications for the Theory of Affordances in Management</i>	244
6.5 <i>Implications for Practice Theory and Phenomenology</i>	245
6.6 <i>Methodological Implications</i>	247
6.7 <i>Practical Implications</i>	249
6.8 <i>Boundary Conditions and Limitations</i>	251
6.9 <i>Directions for Future Research</i>	253
CHAPTER 7: CONCLUSION	255
REFERENCES	257
Glossary Appendix	295
A. <i>Equipment in Air Traffic Control</i>	295
B. <i>Air Traffic Control Rules and Terminology</i>	298
C. <i>Air Traffic Control Contingency Procedures</i>	303
Appendix 1: Further Examples of Improvisation	305
Appendix 2: Additional Evidence for Internal Goods	306
Appendix 3: Additional Evidence for Mood	308
Appendix 4: Additional Evidence for Conforming through Accountability	309

List of Tables

Table 1 - The Five Stages of Skill Acquisition by Dreyfus and Dreyfus.....	106
Table 2 - Summary of Setting Characteristics.....	127
Table 3 - Information about Shadowing and Interviews.....	130
Table 4 - Data Collection in Numbers.....	134
Table 5 - Illustrative Coding with Sample Data.....	138
Table 6 - General Data Framework.....	140
Table 7 - Arrival Procedures.....	157
Table 8 - Phraseology for Each Phase of Arrival Procedure.....	158
Table 9 - Phonetic Alphabet in Aviation.....	300
Table 10 - Number Pronunciation in Aviation.....	301

List of Figures

Figure 1- Control Room Layout.....	151
Figure 2 - Layout of Airport relative to the Control Tower.....	152
Figure 3 - Positions of Arrivals in Episode 1	165
Figure 4 - Position of Non-responsive Pilot and Missed Approach Procedure	172
Figure 5 – Positions of #1 and #2 in Episode 1	188
Figure 6 - Positions of Arrivals in Episode 3	192
Figure 7 – Improvisations in Episode 3	193
Figure 8 - #1 and #2 on Collision Course in Episode 1	197
Figure 9 - Positions of Aircrafts After Initial Response in Episode 1	198
Figure 10 - Aircraft Positions (Episode 1 -continued)	199
Figure 11 - Aircraft Separation Field	203
Figure 12 - Closure of Alpha and Improvised Response	214
Figure 13 - Improvised Response to Closure of Whiskey	216
Figure 14 - Enacting and Experiencing Improvisation	224

Dedication

*To my beloved parents (Giorgos and Flora)
and grandparents (Yiannis and Maria, Demetris and Vasiliki)*

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“For the thing called ‘invention’ (in metre, for example) is always a self-imposed fetter of this kind. ‘Dancing in chains’—to make that hard for themselves and then to spread a false notion that it is easy—that is the trick that they wish to show us.”

F. Nietzsche (2011, §140)

“When you set out on the journey to Ithaca, pray that the road be long...”

C. P. Cavafy (2007, p. 36)

Having become a refugee and living apart from his parents from a very young age, my father, when I was young, once explained that “education is something nobody can take from you”. Ever since I have carried those words in my heart of hearts. Put otherwise, this is something that I have taken for granted throughout my life. Taking things for granted (technically referred to, at least by some, as tacit knowledge, know-how, implicit knowledge, habit etc.) is a habitual predisposition that permits certain possibilities to show up, while others remain unobserved in the shadows. Habitual predisposition is akin to chaining oneself to the inside of a Platonian cave and seeing certain shadows on the wall, while all the time being oblivious to what is happening beyond the cave in question.

Growing up, and thanks largely to my engagement with Philosophy, I came to like the specific set of educational chains I had chosen. Why? Because I came to realise that I was wearing chains in the first place. As Seneca the Younger, the ancient Roman Stoic philosopher, remarked in “De brevitate vitae”, a person who studies philosophy adds centuries of wisdom to their own life. Internalizing and embodying the wisdom of the past (as far as possible), thus, enables one to be open to previously unnoticed possibilities for action. Perceiving more possibilities for action is a manifestation of a greater degree of freedom. This is because seeing more possibilities is tied to being able to notice other responses that are invisible to the chain bearers of established habits of thought and action.

I see my work as an attempt to expose, as far as possible, parts of the aforementioned chains to the light. I seek to show how we gradually come to bear the chains of habit and how the chains in turn become shackled to us, even in cases where we are seemingly less restricted by them – when we improvise. Realising the latter, however, I came to understand that the chains can in many cases be a blessing in disguise. For without them we lack an Archimedean point from which to be connected to the life-world. We can never be free of chains. However, becoming aware of our chains, we can, to borrow from Nietzsche, at least try to choose the chains we dance in. This has importance both for persons and organizations, or at least that is what I believe. To paraphrase William Irvine, a modern Stoic philosopher, most people are unhappy because they have chosen the wrong chains. Thus depending on what people or organizations value, they must be wary about which chains they seek to don.

I cannot take all the credit for reaching my doctoral Ithaca. Many people have helped me on my educational Odyssey. Thus, I would like to thank my parents (Flora and Giorgos), sister (Maria) and grandparents (Yiannis and Maria; Demetris and Vasiliki) for building and maintaining a safe harbour from which to embark on my journey. My Odyssey would have been far poorer and perhaps, unlikely to have even occurred, without Professor Haridimos Tsoukas offering me a ticket. To him I would like to express my infinite gratitude for sparing his precious time to encourage me to plunge even deeper into the abyss of the ‘vita contemplativa’ and seek more arduously for the ‘good life’. I would also like to thank Professor Jacky Swan for her equally precious time during which she patiently offered me her highly perceptive feedback on my writing and made me even more aware of borne chains. I am indebted to Professor Rodrigo Ribeiro who set aside time to discuss snippets from my data and Phenomenology. To Dr Emmanouil Gkeredakis, Dr Pedro Monteiro, as well as my colleagues Anastasia Allayioti, and Ahmed Maged Nofal I will always be greatly indebted for the intellectual stimulation and encouragement during both times of joy and despair. Moreover, I would like to express my deepest gratitude to all participants in this study for their trust in allowing me to observe, participate and write about their work-lives. Last but not least, I can safely say that without the support, encouragement and understanding of Ms Niki Paralimnitou, I would have found it far harder to cross the finish line of my Odyssey.

To conclude, I would like to emphasize that all of the above deserve all the credit for their invaluable help, and any errors in this study are my sole responsibility.

DECLARATION

This thesis is submitted to the University of Warwick in support of my application for the degree of Doctor of Philosophy. I certify that the thesis is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it). It has been composed by myself and has not been submitted in any previous application for any degree.

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ABSTRACT

Organizational improvisation refers to how members of organizations respond intentionally and creatively to situations with abysmal planning. This is an important skill to have because organizations are constantly faced with novel situations to which they often have very little time to respond. The thesis reviews the literature on organizational improvisation and organizes the literature in three perspectives. In turn this allows the study to identify that the hitherto research on improvisation has overlooked lived experience, emotions and values, as well as to note that accounts of improvisation are conceptualised, to a large degree, through stable, separable entities rather than through ongoing enmeshed processes. Seeking to pay particular attention to addressing the aforementioned limitations of the literature, this study attempts to answer the question of how improvisation is enacted and experienced. To do so the study synthesizes insights from phenomenology, practice theory and strands of ecological psychology and applies these insights to the interpretation of data collected using ethnographic techniques from an air traffic control unit. This study contributes to the literature by introducing and synthesizing new conceptual distinctions that better enable research to capture the ongoing, value-laden and lived qualities of experiencing and enacting improvisation.

CHAPTER 1: INTRODUCTION

“Unexpected events occur mostly because we create organizations that construct and enact expected events in the first place.” (Weick & Sutcliffe, 2015, p. 29)

“Insofar as organized contexts are inherently open systems, and to the extent that organizational rules are intrinsically open-ended in their application, every problem has some degree of novelty.” (Tsoukas, 2005, p. 85)

1.1. Research Background

Organizing is incessantly enacted and re-enacted on the background of a social world that is an open system. Organizing refers to the activities used to coordinate the actions of individuals towards achieving a common goal. The latter are heavily reliant on conventions (Gkeredakis, 2014), which establish the distinction between expected and unexpected occurrences (Weick & Sutcliffe, 2015). An open system, at least in the social realm, refers to a setting in which its constituent elements (e.g. conventions) are prone to contingent variation (Tsoukas, 1998b, 1998a). Insofar as organizations rely on conventions and rules for organizing, they are prone to experience unexpected occurrences due to temporal asymmetry. Temporal asymmetry refers to the fact that conventions used for organizing are grounded on past experience (Tsoukas, 2009b). However, as encountered situations are prone to having new inimitable features, past experience may not be able to encompass situational uniqueness and novelty (Tsoukas, 2016; see also Hadjimichael, 2017).

This is a frequent and well-evident occurrence throughout the history of organizations from antiquity until today. For example, in the Second Punic War, Hannibal, a Carthaginian general, surprised the Roman Republic by leading his army (including 37 elephants) across the Alps into Italy (Mahaney, Kapran, & Tricart, 2008, p. 225). A feat no other African general had ever attempted. In the Hundreds' Year War, in a society dominated by the nobility and where the

role of women was much degraded, to the surprise of many, a teenage woman without a noble background, Joan of Arc, emerged as a leader of French armies in their fight against the English (Warner, 2013). In the Second World War, the Japanese realising the imminence of defeat decided to enact the kamikaze practice – Japanese pilots were urged to crash their fighter planes into American naval ships (Orbell & Morikawa, 2011). More recently, on 11 September 2001, in a mutation of the kamikaze practice, terrorists hijacked passenger airlines to crash into landmarks of the United States (Hoffman, 2002).

Novel situations are also abundant in contemporary organizations. During the climb out of US Airways Flight 1549, on 15th January 2009, the aircraft struck a flock of birds causing the aircraft's engines to lose all power. Unable to steer the aircraft to an airport for an emergency landing, the pilots improvised by gliding the aircraft to a ditching (i.e., water landing) on the Hudson river near midtown Manhattan (Sullenberger, 2012). Everyone survived. More mundane examples of novelty include introducing new software to a work setting (Orlikowski, 1996), coping with unusual customer queries (Tsoukas & Vladimirou, 2001), coping with staff absences during a film shooting (Bechky & Okhuysen, 2011) and navigating a large ship while suffering an engineering breakdown (Hutchins, 1991).

All the above, when first encountered, caused much surprise. Hence, the organizations or agents facing these novelties, in order to accomplish their objectives, had to, initially at least, creatively adapt their conventional responses to the situational uniqueness with little to no pre-meditation. The process through which the latter was accomplished is referred to as organizational improvisation. Cunha and colleagues (2017, p. 560) define organizational improvisation as “the convergence of design and performance (extemporaneity), the creation of some degree of novel action (novelty), and the deliberateness of the design that is created during its own enactment (intentionality)”. Due to the social realm's ‘magmatic’ foundations, novelty is and will remain an inherent feature of human experience (Castoriadis, 2005b). “First-time events”, Tsoukas (2016, p. 145) specifies, “are not the exception but

the rule in human life”. As such, it is very important to understand the process (i.e., improvisation) through which agents are able to craft responses to the novel and unique.

1.2 Organizational Improvisation in Organization Theory

During the last three decades, organization theorists, as will be discussed in depth in the next chapter, have intensified their efforts to understand improvisation in organizations (see Baker & Nelson, 2005; Cunha, Cunha, & Kamoche, 1999; Tsoukas, 2011b). Organizational improvisation has been explored through theoretical studies (see Crossan, Cunha, Vera, & Cunha, 2005; Kamoche, Cunha, & Cunha, 2003; Weick, 1998), as well as across a plethora of settings using large scale quantitative studies (Kyriakopoulos, 2011, e.g., Dutch food industry; Magni, Proserpio, Hoegl, & Provera, 2009, e.g., information system development; Vera & Crossan, 2005, e.g., municipality) and in-depth case studies (Batista, Clegg, Cunha, Giustiniano, & Rego, 2016, e.g., emergency room; Bechky & Okhuysen, 2011, e.g., SWAT teams and film crews; Weick, 1993b, e.g., firefighter units).

Nevertheless, several scholars have noted some limitations of extant research. Specifically, in an extensive review of the literature, Hadida and colleagues (2015, p. 444) highlighted that there is only a small number of empirical studies on the phenomenon. In their seminal study Bechky and Okhuysen (2011, p. 239) underline that there is a lack of understanding of how organizations “develop the responses to unexpected events”. Indeed, memory and knowledge are sometimes equated, causing considerable ambiguity about how and whether both contribute to the enactment of the phenomenon (see Moorman & Miner, 1998a, 1998b).

More recently, it has been noted that the experience of agents improvising has been severely underexplored (Fisher & Barrett, 2019) and that accounts of improvisation tend to overlook the role of values (Visser, Heusinkveld, & O’Mahoney, 2018, p. 356) and emotions (Cunha et al., 2017, p. 567). Moreover, a fair number of studies use a disjunctive conceptualization

(i.e., explanations tend to be decontextualized and attribute explanations to number of distinct, yet interacting elements) (see Tsoukas, 2017). As a result, accounts of improvisation seem to be rationalistic (Visser et al., 2018, p. 356), which leads them to be, to a degree, alienated from common experience, thus failing to fully take into account tacit knowledge agents draw upon.

Furthermore, as will be seen in Chapter 2, at best, studies on organization improvisation utilise a “weak-process” conceptualization. According to Langley and Tsoukas (2017, p. 3), the latter way of theorizing about organizational phenomena recognizes that phenomena consist of ongoing processes, but the processes are considered to be subsidiary to a stable entity. This is problematic because it underestimates the prevalence of novelty and improvisation in organizations, which several studies have pointed out (Batista et al., 2016; Feldman, 2000; Tsoukas, 2016; Tsoukas & Chia, 2002).

To sum up, all the above pose the danger of underestimating the richness and nuances involved in the process of organizational improvisation, which in turn are likely to contribute to an impoverished understanding of the phenomenon.

1.3. Purpose and Contributions of the Study

The purpose of this study is to contribute to the literature on organizational improvisation by answering the question: *How do agents enact and experience improvisation?* The study’s answer to the research question will attempt to pay particular attention to addressing the limitations identified above. As this is a broad research question, it should be noted that it will be further refined into more specific research questions by the end of Chapter 3. In parallel, it should be highlighted that the study will be explanatory in nature and will take the phenomenological experience of socially-embedded agents as the unit of analysis. By the latter I mean that my explanatory focus will not be strictly on individual experience, but rather on individual experience in relation to their sociomaterial environment. This is because individual and environment are entwined - responses to situations can only be enacted insofar as agents are

already immersed in an environment and can draw on their surroundings (Lamprou, 2017; Orlikowski & Scott, 2008).

More specifically, by drawing on an ethnographically-informed investigation of an air traffic control (ATC) unit, this study hopes to make three contributions to the literature. First, particular attention will be paid to capturing how improvisational responses are developed. To be able to enact any action (including improvisation) necessarily relies on tacit knowledge (also often referred to as know-how and procedural knowledge) (Hadjimichael & Tsoukas, 2019, p. 675). Tacit knowledge is the knowledge people draw upon in action, but are oftentimes unaware of and have difficulty articulating (ibid., p. 673). Due to the lack of understanding of how improvisation is enacted, the study will seek to theorize the role of tacit knowledge in improvisation processes. Second, the much neglected aspects of improvisation, namely, lived experience, emotions and values (or goods) of sociomaterially-embedded agents will be given a prominent position in the theorizing of the enactment of improvisation. Finally, I will attempt to offer a micro-focused explanation of the experience and the enactment of improvisation by utilising a “conjunctive” account that has a strong process orientation. Tsoukas (2017, p. 132) defines conjunctive theorizing, as theorizing that pays specific attention to capturing performativity and establishing connections between different elements of human experience that are normally considered to be separate. A “strong process” orientation is defined as viewing phenomena as continuously changing over time (Langley & Tsoukas, 2017). All the above are deemed important in order to develop an account of how improvisation is enacted and that is in intimate correspondence with everyday experience.

More specifically, I build on the insight that over time immersion of agents in a practice allows the development of a non-perfect, but skilled understanding of what to do and how to respond during emergent situations in practice (i.e., tacit knowledge). This skilled understanding is then seen to allow practitioners to spontaneously perceive what is a normatively accepted and relevant response to situational exigencies. I argue that the spontaneous

perception of possibilities during practice is tantamount to perceiving situationally relevant affordances. The latter, however, is tempered by emotional responses and the perception of the implications of situations in relation to what is intrinsically held to be good by their practice. Drawing on my ethnographically informed study, I explore how the perception of relevant affordances in relation to emotional reactions, informs the nuanced understanding practitioners have and shapes their improvised responses to emerging situations. As my findings show, being solicited by affordances is what catalyses improvisation behaviour: if one uses something (an item itself, or performs an action to improvise), it is because the person could perceive its utility in the first place in relation to preserving the good of their practice. I then argue that depending on the exigencies of each situation, being solicited by affordances gives rise to four improvisation practices (each will be described in detail in Chapter 5). The above theorization alludes to the three aimed contributions: (i) capturing the enactment of improvisation and (ii) the lived experience of improvisation in relation to values (or goods), both of which are underlined by (iii) a conjunctive and strong process theorization.

1.4 Structure of the Study

So far, I have established, I hope, that improvisation is an important topic to be investigated and that there appear to be significant gaps in how we understand the experience and enactment of improvisation. In this section, I will outline the structure through which the present study seeks to complement current understandings of improvisation.

In Chapter 2, I critically present and discuss the existing literature on improvisation. I identify three perspectives in the literature. Each uses a different theoretical lens through which to picture improvisation. It is important to note, however, that each way of picturing highlights certain aspects of the phenomenon of interest, while it overlooks others (Morgan, 1997). Thus the goal of this chapter is to show how each way of picturing highlights certain

aspects of improvisation and then to illustrate which aspects are underexamined.

In Chapter 3, I draw on phenomenology, practice theory and strands of ecological psychology. Phenomenology was selected because it allows one to understand the experience of agents (Sandberg & Dall’Alba, 2009). Focus on agents experience while improvising has been neglected (Fisher & Barrett, 2019). Practice theory was selected because it permits one to focus on the broader sociomaterial context in which an agent dwells (Nicolini, 2011; Nicolini, Mengis, & Swan, 2012). Focus on the sociomaterial environment for understanding improvisation is important because agents can only respond to situations insofar as they draw upon their surroundings (see Lamprou, 2017). Agents do not improvise in a vacuum. Finally, ecological psychology was selected because it allows one to understand the perception of agents in relation to their environment (Gibson, 2015a). In other words, it allows one to see that perceptual experience is tied to one’s sociomaterial environment. The combination of the three will allow Chapter 3 to lay the groundwork for an alternative way of picturing improvisation that sheds light on the aspects that have been hitherto overlooked. I am mindful that even this way of picturing neglects certain aspects. However, as the development of a panoptic view of our world is an impossibility (Harré, 1985; Nagel, 1986), it should suffice that the groundwork for the new way of picturing attempts to complement existing views on improvisation (Morgan, 1997).

In Chapter 4, I outline the research methodology used to empirically investigate the phenomenon of interest. Specifically I outline why I chose the qualitative paradigm and more specifically the use of ethnographic techniques. I then explain why the setting of ATC was chosen to empirically investigate improvisation. After this I explain how the data was collected and then analysed.

In Chapter 5, I present my findings from the empirical investigation. I begin by offering a general background of the research setting. This is then followed by an account of how improvisation unfolds in this setting by drawing

on various episodes of documented improvisation, extracts from interviews and observations. The findings are presented using a thematic conceptual scheme that emerged during the analysis.

In Chapter 6, I discuss my findings and relate them to the existing literature. The purpose of doing so is to clearly outline a new conceptualization of how improvisation is enacted and to illustrate how the latter offers original contributions to the extant literature and practice. I then consider the limitations of this study and following this, I propose directions for future research. Finally, in Chapter 7 I offer some closing remarks.

CHAPTER 2:IMPROVISATION - A CRITICAL REVIEW OF THE LITERATURE

“First-time events are not exception but the rule in human life.”
(Tsoukas, 2016, p. 145)

“I do not think we need a separate ecology of mind, distinct from the ecology of energy flows and material exchanges.” (Ingold, 2002, p. 19)

2.1 Introduction

The purpose of this chapter is to review the literature that is relevant to how members of organizations improvise in response to unexpected occurrences. By doing so I will seek to sketch out the different perspectives on this phenomenon, how each perspective conceptualises this phenomenon, where each perspective focuses its explanation on and what explanations have been proposed. Three broad sets of theoretical perspectives are identified: (i) the metaphor perspective, (ii) the cognitivist perspective and (iii) the sociomaterial perspective. Each perspective incorporates different theoretical assumptions and methodological approaches which reflect what they prioritise and see to be of interest. Despite their differences, all perspectives converge on some aspects of the definition of improvisation: it is an activity which pertains to the simultaneous use of planning and execution, where preconceived material (e.g., policies, rules, protocols, routines, knowledge) is adjusted to varying degrees in order to deal with the exigencies of a specific situation (see Cunha et al., 1999, 2017; Hadida et al., 2015; Vera & Crossan, 2005; Weick, 1998, p. 544)

The metaphor perspective is one of the first approaches to be adopted for studying improvisation. This perspective emphasises that to study this phenomenon one must draw on analogies from aspects of improvisation mainly from the arts (especially jazz music and improvisation theatre) and then relate these to how organizations may develop improvised responses to the exigencies of situations faced (Hatch, 1999; Kamoche et al., 2003; Vera & Crossan, 2004). As such, the focus of this perspective is on illustrating the similarities between

the arts and organizations when having to craft novel solutions. So, attempts to explain how novel responses are improvised by organizations is achieved via the linguistic device of metaphor. Metaphors are utilised to present what characterises and facilitates improvisation in the arts and how this could also be the case in organizations too. As a consequence, the majority of these studies do not focus upon instances of improvisation within organizations, but instead rely mostly on theoretical arguments which do not utilise detailed empirical evidence gathered from organizations.

From a different angle, the cognitivist perspective, seeks to explain how organizations craft responses to arising situations by focusing on the individuals that are part of it. Specifically, it reduces such explanations to how organizational members process information. Hence, the focus of this perspective is not the organization or any similarities with the improvisational arts, but the individuals within each organization and more specifically, how their knowledge and memory are related to the way they process situations which require novel responses (e.g., Bingham & Eisenhardt, 2011; Kyriakopoulos, 2011; Moorman & Miner, 1998b). Consequently, this perspective conceptualises responses to the unexpected primarily (but not always) as a rational mental phenomenon (cf., Weick, 1993b): first an individual must engage in information processing, which in turn is applied to the situation at hand. Different methodological approaches have been utilised by this approach. They range from purely theoretical arguments, to in-depth qualitative studies and quantitative analysis.

The sociomaterial perspective seeks to offer explanations of how organizations respond to unexpected situations in reference to locally available normative structures/practices and/or resources (e.g. Baker & Nelson, 2005; Bechky & Okhuysen, 2011; Yanow & Tsoukas, 2009). Thus, unlike the above two, it neither focuses on individual mental processes, nor on comparing instances of improvisation in one setting with another. Therefore, the key characteristic of this perspective is to show how unfolding sociomaterial processes influence improvisation. While most sociomaterial studies do so in

terms of holistic approaches (e.g., Batista et al., 2016), some studies discuss latter in terms of variables (Davis, Eisenhardt, & Bingham, 2009). The majority of the scholars adopting this perspective rely on the analysis of singular cases of improvisation that have occurred in organizations (cf. Davis et al., 2009).

The aforementioned perspectives are presented, in the three following sections respectively. Within each respective section the main findings and theoretical claims of the perspective under discussion will be outlined. After the illustration of each perspective, I offer a critique so as to explicate both their contributions and limitations. Once all perspectives are illustrated, an evaluation is attempted across all three perspectives. The evaluation will be concentrated upon the discussion of each perspective's onto-epistemological assumptions, methodological orientations and theoretical claims. Even though the different perspectives offer competing understandings, they nevertheless largely share a common assumption. That is, most scholars studying the phenomenon of how responses to unexpected events are enacted - some implicitly and others explicitly - differentially draw a line between the individual's mind and the environment. In addition to this, improvisation is largely conceptualized as the *rational* outcome of the interaction between the individual and their environment. Hence, the process of how improvisation is actually lived and experienced by agents in a dynamic and ever changing environment is side-lined in order to offer mainly retrospective explanations of the concept. As a result, what actually occurs during improvisation - an integrated explanation of how improvisation is enacted through the point of view of a sociomaterially embedded agent, has not been fully developed (viz. lived experience) (see Fisher & Barrett, 2019, p. 149). Both the nature and adequacy of these limitations will be fully scrutinized.

In sum, this chapter has two objectives. The first is to outline the theoretical lenses of the respective perspectives and the second is to evaluate each's findings. The depth in which each of these objectives will be pursued will depend on both their relevance to this study and the perspective under consideration. It should be noted, that the intended result of this critical review

is not to provide a clear answer to the research problem of this project. Instead, it is expected that it will afford problematizing the current literature and by doing so, to open a new window to formulate the initial questions which will guide the rest of this study.

2.1.1 Literature Review Methodology

To ensure that the literature on improvisation was systemically reviewed I combined three complimentary search methods. First, I conducted a search on the Web of Science. I used the keyword “improvisation” and its synonym “bricolage” to search for articles published in highly reputable journals the fields of Business, Management, Sociology and Psychology (from 1900 to 2019). The search returned studies that utilized wide range of theoretical and methodological approaches for studying the phenomenon and represent both American and European schools of thought. After carefully reading each of the returned articles I decided to only include the articles in which improvisation was central to the study, rather than auxiliary. In addition to the journal articles I also searched for books or book chapters that focus on improvisation/bricolage (Berliner, 1994; Cunha et al., 2017; Hutchins, 1995, 2010; Kamoche, Cunha, & Cunha, 2002; Sawyer, 2011).

Second, to complement the findings of the above searches, I used a snowballing technique by checking the reference lists of other literature reviews that were already published on the topic (Cunha et al., 1999, 2017; Cunha, Neves, Clegg, & Rego, 2015; Hadida et al., 2015; Vendelø, 2009). In this way, I ensured that studies that were relevant to improvisation, but not returned in the database search, were included in this chapter. Finally, the reference lists of the latter studies were also considered to ensure that no improvisation-related studies were overlooked.

2.2 The Metaphor Perspective

The engagement of organizational theory with metaphors is not an event that was triggered by the study of organizational improvisation. It was

popularized by Gareth Morgan's (1980) article titled "Paradigms, metaphors and puzzle solving in organization theory" and the subsequent publication of his seminal book "Images of Organization" (1997). In the book, it is argued that metaphor is a driving force of creating new theory (both in the humanities and sciences). The linguistic device of metaphor in its simplest form operates as a discursive process which claims that "X is Y" and that the signifier (X) is used to understand the signified (Y), or vice-versa (Cornelissen, 2006).

For instance, consider the two following metaphors: (i) Shakespeare's famous line from his play "As you Like it": "All the world's a stage" or (ii) the popular dictum of "time is money". In the first metaphor, we seek the commonalities between the world and the stage (e.g., how all people essentially enact certain social roles), and in the second the commonality between time and money (e.g., time is seen as a finite resource that can be used to produce wealth). The result of attending to these commonalities is the generation of partial "truths" which can provide significant insights, but if taken too literally can be distorting (Morgan, 2017, p. 19). According to Cornelissen and Kafouros (2008), metaphors have the ability to advance and augment understandings about organizations depending on whether the utilised metaphors capture several relevant features and are easy to understand.

Tsoukas (1991, pp. 569–570) further refined our understanding of metaphor in organization studies by discussing the underlying mechanisms of metaphors: *similes and analogies*. Specifically, a simile is defined as "a comparison of one thing with another" (e.g., the world is like a stage) which highlights the commonalities between two different domains. As such, any metaphor implicitly depends on the existence of a simile. An *analogy* is defined as the operationalization of "metaphor or a simile by focusing on *relationships between items*". So essentially an analogy seeks to underline that the characteristics of two seemingly unrelated objects/constructs can be shown to be related by employing the same "explanatory structure". For example, the stage is to an actor as the world is to any member of society. Analogies can be used both within the similar domain (e.g., the sun is to daytime what the moon

is to night-time) or between two conceptually dissimilar domains (e.g., Descartes is to modern philosophy, who Newton is to modern physics).

Bearing in mind the above discussion about the mechanics of metaphors, the explanation of how metaphors have played a significant part of furthering our understanding of organizational improvisation should become clearer. Specifically, scholars studying how organizations devise responses to the unexpected, have sought to operationalise metaphors to draw to our attention the similes and analogies across diverse domains and organizational improvisation. The key reason for this is the inherent complexity in explaining organizational responses to unexpected events. Thus, by utilising metaphors, researchers hoped that doing so would make the phenomenon more understandable (Hatch, 1998).

The most popular metaphor employed is jazz, followed by improvisational theatre (Hadida et al., 2015, p. 443). According to Cunha et al (1999, p. 301), the reason these two domains were drawn upon so extensively is because improvisation within these settings is the “norm”. Other important metaphors utilised include Indian music, music therapy (Kamoche et al., 2003), computer platforms (Ciborra, 1996) and real time foresight (Cunha, Clegg, & Kamoche, 2012). For the sake of a clear review of what each metaphor has contributed to our understanding of organizational improvisation, this section will be subdivided into the following subsections: (i) jazz metaphor, (ii) improvisation theatre metaphor and (iii) other metaphors.

2.2.1 Jazz metaphor

Research on organizational improvisation has been linked with jazz since its infancy in the late 1980s and has generated numerous insights (Hadida et al., 2015, p. 443). Bastien and Hostager (1988) were some of the first to draw on jazz to make sense of organizational innovation. They did so by analysing a videotape of a concert of four jazz musicians who improvised a performance without prior rehearsals. The authors argue that jazz and organizations converge in two basic ways when improvising.

First, like jazz performers, organizations face similar circumstances of uncertainty by operating in unpredictable markets. A decade later, Barrett (1998) notes that both groups (jazz musicians and organizational members) respond to new situations in novel ways without being certain of the outcome. As a result, both discover the results of their actions while being in the midst of action.

Second, similar to improvised performances of jazz pieces, organizational members that improvise always rely on both *technical* and *social structures* (Bastien & Hostager, 1988). These structures can be either tacit or explicit. Technical structures are understood to include skill in a task and knowledge of task (e.g., melody, keys, playing jazz). Social structures are understood to include behavioural norms (e.g., roles in band) as well as attitudes (e.g., risk taking) and communication codes (see also Kamoche & Cunha, 2001, pp. 745–748). Building on the above, authors utilising the jazz metaphor to explain organizational improvisation have gone so far as to consider “the jazz band as a prototype of organization” while improvising (Barrett, 1998, p. 605; Berniker, 1998; Dennis & Macaulay, 2007). I will discuss social and technical structures in turn.

By drawing on the jazz metaphor, researchers illustrate that both jazz musicians and organizational members always improvise in relation to an established social structure. That is, a hierarchy or established sequentiality (i.e., an expected sequence of responses to certain actions) which revolves around certain shared norms, stories or objectives (Cunha & Chia, 2007; Griffin, Humphreys, & Learmonth, 2015; Humphreys, Ucbasaran, & Lockett, 2012; Kamoche & Cunha, 2001; Zack, 2000). For example, jazz musicians take turns in taking the lead by soloing while the rest of the band must follow the lead by listening carefully to each other. But the musician who takes the lead must implicitly maintain the structure of the ‘head’. The head of a tune; a basic melodic idea that is usually played at the beginning and the end of a song. Although, improvisation centres around the head (e.g., by changing the key, or rhythm or harmony), one cannot discard it completely as it serves as the

invisible stitching holding a performance together (Hatch, 1999, pp. 78–79; Pavlovich, 2003, pp. 443–444).

Similarly in organizations, members follow an established sequentiality of action (see Llewellyn & Hindmarsh, 2010), wherein collaboration is expected by paying attention to each other, just like the jazz band (Peplowski, 1998, pp. 560–561). Moreover, jazz soloists may be seen as managers, who introduce something new and their subordinates need to adapt to it (*ibid.*, p. 561). However, both senior staff and subordinates are confined and held accountable by the organizational rules. Hence, like jazz musicians which must adhere to maintaining the head while improvising around it, organizational members must maintain and improvise around organizational rules and norms.

At the same time, several authors highlight that to improvise successfully in both jazz or organizations, agents must adhere to predeveloped technical structures (Barrett, 1998; Crossan et al., 2005, p. 140; Dennis & Macaulay, 2007, p. 616). The latter being, the techniques (i.e., know-how) developed through practice. Likewise, Weick (1998, p. 544), stresses that both jazz musicians and organizational members can in fact with adequate experience be disciplined “practicers”, who can appropriately draw on various techniques to improvise. Consider learning to be jazz musician. One must first develop a deep understanding of jazz as genre. This understanding is acquired with years of exposure, imitation of the masters of the genre as well as plenty of hands on trial and error (Dennis & Macaulay, 2007). When mastery is attained, the musician is free to notice the reactions of the crowd or their fellow musicians which in turn allows them to select an appropriate response by drawing on their repertoire of techniques (Barrett, 1998; Hatch, 1999; Peplowski, 1998). This is similar, to what occurs to an experienced member of an organization. After years of practice, members master the routines and rules of their organization and improvise around them (Barrett, 1998).

Consequently, three major insights have been generated about organizational improvisation by drawing on the jazz metaphor: (i) improvisation is linked to crafting responses with uncertain outcomes; (ii)

improvisation always occurs by the individual relating to social structures; (iii) to improvise successfully the individual must relate the situation to the appropriate technical structure. Despite these important insights, the suitability of utilising the jazz metaphor has been questioned. A key reason behind the questioning being the fact that not all organizational theorists or practitioners have a good understanding of the technical nuances of jazz and its terminology (e.g., head, keys, melody) (Vera & Crossan, 2005). This in turn has been argued not to allow researchers or members of organizations who lack a musical education, to grasp the jazz metaphor correctly.

2.2.2 Improvisational Theatre Metaphor

Improvisation theatre entails performing a play in which the plot, characters and conversations are created in the moment. For inspiration, in many cases, actors may take cues from the audience. In contrast to jazz, improvisational theatre is a much less technical field which is easier to understand to all. This is because improvisation theatre draws on material of everyday interaction which is familiar to all. Such material being: speech (e.g., words, sentences, verbal expressions, tone of voice), bodily movement (e.g., facial expressions, posture, gestures) and everyday events (e.g., marriage, financial transactions, mourning) (see Crossan, 1998). As such, improvisation theatre is argued to be a more useful metaphor to use in order to understand improvised organizational responses due to its content being more accessible, universal and transferable (Vera & Crossan, 2005, p. 204). Like the use of the jazz metaphor, the use of the improvisation theatre metaphor focuses around the similes and analogies between the theatre's domain and the organizational domain (see Meyer, 1998, pp. 573–575).

Two facets of similarity between improvisational theatre and organizational improvisation that are commonly used by the researchers utilising the improvisational theatre metaphor: (i) spontaneity (also referred to as: “letting go”) and (ii) creativity (also referred to as: “making do”). Both are considered to be two key “dimensions” of the “latent construct” of organizational improvisation (Crossan & Sorrenti, 2002; Gibb, 2004, p. 734;

Vera & Crossan, 2004, p. 735, 2005, p. 205). This is because, like improvisation theatre, organizations must respond to situations under time pressure and ambiguity. On the one hand, the spontaneous dimension of the construct refers to the fact that like actors in improvisation theatre, organizational agents are required to react to a situation on the “spur of the moment” without knowing about it in advance. On the other hand, the creative dimension in both theatrical and organizational improvisation is “making do” with what is available in the moment and highlights that although improvisation is a creative process, does not always produce innovative outcomes.

For organizations to be as successful as improvisation theatre when responding to unexpected events they need to maximize the use of the two aforementioned dimensions. To do so, organizations must emulate the improvisation theatre in a number of ways (see Crossan, 1998). Improvisation theatres like any organization are considered to be “cultural entities” (Vera & Crossan, 2005, p. 205). Therefore, for organizations to be able to improvise, they must adopt an appropriate culture. Specifically, they must adopt a culture where experimenting is not punished, but sought after. By doing so, the organization is argued to be able to offer both cognitive (i.e., shared mental models) and emotional resources (e.g., trust, respect and support) to the individuals which will make them more open to improvising (Vera & Crossan, 2004, p. 733, 2005, pp. 206–207). By promoting an experimental culture where people share common interpretations, organizations like successful improvisation theatre companies are more likely to develop trust and respect among their members (Vera & Crossan, 2005). The latter are key to improvisation as the individual members of organizations are more likely to be acceptive of colleagues undertaking risks – as actors do in successful improvisation theatre companies (Crossan, 1998). However, no other effects of emotion-related constructs are explored.

Following the above, researchers utilising the improvisation theatre metaphor explicitly argue that the organizational or group level is so different to the individual level, that “the ultimate link” between the two are shared

mental models (Crossan & Sorrenti, 2002, p. 37). On the individual level, both members of organizations and theatre actors, are seen as distinct entities which store “information and algorithms” in their memory to which they have access instantaneously if required (Vera & Crossan, 2005, p. 206). The information stored in each individual’s memory is seen to be dependent on the cognitive and emotional resources made accessible by the organization. This mental process allows members to store expertise that is relevant to their roles and thus be more able to think on their feet. According to Crossan (1998) individuals in both improvisation theatre and organizations, can acquire expertise in improvising by practicing certain techniques and learning principles (see also Meyer, 1998).

Vera and Crossan (2005) conducted one of the few empirical studies that relied on the improvisation theatre metaphor to explain organizational improvisation. Specifically, they collected survey data from teams of a municipality that was participating in training about improvisation. In addition to the survey data, the authors collected 20 semi-structured interviews to get a sense of the types of improvisation the participants engaged in as part of their work. The authors utilised the improvisation theatre metaphor to justify the constructs they selected to test. For example, as discussed above individuals with more expertise are more likely to be successful in improvisation, or that better relationships between a team has better results in improvising. As a result, the authors tested whether these two factors as well as the existence of memory, experimental culture and real-time information *moderate* the relationship between improvisation and innovation. The results of their study found that the relationship between improvisation and innovation is equivocal and essentially influenced by four factors: (i) expertise, (ii) teamwork, (iii) the existence of experimental culture and (iv) real-time information. Moreover, they also found that if people are trained to improvise this increases the frequency and quality of enacted improvisations.

To summarise, the improvisation theatre metaphor has furnished organizational theory with the following insights: (i) organizational improvisation can be considered to be a variable which is comprised of two

dimensions (spontaneity and creativity); (ii) the organizational culture (sometimes conceptualized as a variable because it is measured) influences the frequency of enacted improvisations; (iii) individuals store cognitive and emotional organizational resources that in turn influence the quality of enacted improvisations; and (iv) organizational members may be able to learn to improvise if trained to do so.

2.2.3 Other Metaphors: Indian Music, Music Therapy, Computer Platforms and Real time foresight

Even though most research conducted on organizational improvisation has relied on the two above metaphors, researchers realised that the utilisation of other metaphors could also potentially allow them to gain new insights into the phenomenon (see Ciborra, 1996; Cunha et al., 2012; Kamoche et al., 2003). As argued by Tsoukas (1993, p. 324), different metaphors allow one to “generate alternative social realities” (see also Morgan, 1997, p. 4).

Kamoche and colleagues (2003, p. 2026) attempt to establish the validity of the Indian music and music therapy metaphors with antecedents, influencing factors and outcomes of improvisation. The authors argue that antecedents to improvisation are divided into motivating factors and the potential to improvise. The former are equated to the social structures, while the latter to technical structures; both of which were discussed in the jazz metaphor subsection. The authors define influencing factors as moderators of improvisation such as the ones identified in the subsection of improvisation theatre (e.g., teamwork, memory, competence). Outcomes of improvisation were defined in relation to whether it was successful, novel or adaptive. Both the Indian music and the music therapy will be discussed in turn in relation to antecedents, influencing factors and outcomes Kamoche and colleagues identify.

Indian music has been argued to offer incremental insights over the jazz metaphor (Kamoche et al., 2003) despite both requiring the antecedents of a social structure which is favourable to experimentation and specific technical structures. The key differences between jazz and Indian music are that the latter is not written, but transferred orally and that performers tend to be competitive

with their colleagues instead of cooperative during performances. Due to the lack of written Indian music pieces, each time Indian music is performed it must be reproduced with variations. Each time, performers may essentially create new music, but this must preserve the musical score that is common in the Indian music tradition. Hence, like jazz musicians and organizational members, musicians within this musical tradition must depend on their memory to be able to improvise. However, in each performance, musicians seek to ‘outphrase’ each other when soloing (Sharron, 1983). As such, a key difference in the influencing factors of improvisation is that instead of teamwork focusing around cooperation (like in jazz), it focuses on competition. Similar to jazz, the outcomes of improvising in the Indian music tradition result in creating novelty. Consequently, the Indian music metaphor of improvisation has been argued to be useful when one must interpret organizational cases of improvisation that are characterised by competitiveness (instead of cooperation) and novelty (Kamoche et al., 2003), such as teams of designers trying to pitch their own work.

Music therapy is a recognised psychiatric technique for assisting people suffering from mental health problems. The therapist allows patients to improvise while using musical instruments (e.g., drums) or singing. The purpose being to bring a change in their behaviour and emotional state. Because each patient is different, there is no standard repertoire to draw upon and no limitations on genre or topic selection. Usually the theme of each session is chosen by the therapist whose goal is to lead his patient to improvise. Therefore, only the therapist must rely on their memory of any technical structures and the improviser does not require any practice. However, the building of trust between therapist and patient is pivotal to the success of the therapy. Following the above, the requisites of improvising in this tradition rely on a social structure which favours patients and therapists experimenting, but only the therapist is required to memorize a technical structure. The core influencing factors are the existence of trust between the therapist and the patient and the initiative of the therapist introducing a theme for the sessions. In contrast to the other

metaphors, the outcome is not centred around creating novelty but of problem solving. In summary, Kamoche et al (2003) have argued that this metaphor is best suited to interpreting improvisation of organizational examples that are dysfunctional and require a knowledgeable problem solver (like the musical therapist) to guide the organization out of its problems.

Cibora (1996) used the metaphor of platform to understand how Olivetti, at the time, a leading computer firm, underwent transformations over a 10-year period of uncertainty. In computers, a platform is likened to a “cognitive engine” users draw upon enact different operations (ibid., p.104). For example, to use text editor a computer must have an operating system (i.e., computer platform) that can execute such a programme. Thus, like the operations of a computer rely on its platform, organizations act as the platforms for their members. Specifically, an organizational platform is defined as “a formative context that moulds structures, and routines shaping them into well-known forms, such as the hierarchy, the matrix and even the network but on a highly volatile basis” (ibid., p.103). Therefore, the organization is understood as a “collective cognitive scheme” that enables members to improvise through creatively recombining organizational resources (ibid., p.116).

Finally, Cunha and colleagues (2012, p. 265) metaphorically present, in the context of strategy, improvisation as “a form real time foresight”. Like the Maginot line, built by the French as a safeguard against German aggression prior to WW2, plans often become redundant in the face of fast-changing environments. Hence, the authors suggest that organizations should focus on detecting weak signals (i.e., difficult to detect indicators of potentially emerging issues). As the latter entails the detection of unexpected elements, effectively dealing with environmental change entails responding through improvisation. Consequently, the authors suggest that when strategists deal with weak signals through improvisation, they are in fact acting with “real time foresight” (ibid., p. 265).

2.2.4 Critique of the Metaphor Perspective

The Metaphor perspective has played a significant role in helping make sense of improvisation. As illustrated in a recent review by Hadida et al. (2015, p. 443), metaphors have served management scholars as sense-making devices which allowed analogical thinking between the management and art discourses. Some key insights offered by drawing on art metaphors include highlighting that like artists, practitioners must react in real time to emerging circumstances in novel ways (Barrett, 1998; Barrett & Hatch, 2003; Crossan, 1998; Vera & Crossan, 2004, 2005; Weick, 1998; Zack, 2000). But, in parallel, these novel responses do not occur outside social hierarchies, norms, technical standards or infrastructures (Barrett, 1998; Kamoche & Cunha, 2001; Kamoche et al., 2003, p. 2028). As the Organization Science Jazz festival special issue illustrates, analogies from the arts have enabled organization scholars to understand that improvisation is an inherent feature of organizations (Meyer, Frost, & Weick, 1998). In fact, the editors of the special issue posit that improvisation itself should be understood as “a metaphor for organizing”.

However, the tendency to focus primarily on metaphors, rather than on instances of organizational improvisation themselves (Dennis & Macaulay, 2007; Zack, 2000) ‘black boxes’ the process through which improvisation is achieved in specific settings. As a result, Hadida et al. (2015, p. 444) have noted that “metaphorical OI [Organisational Improvisation] research still largely outnumbers empirical OI research”. Hence despite the benefits of using metaphors (Letiche & Van Uden, 1998; Tsoukas, 1991, 1993), it is no surprise that some scholars have highlighted that *solely* relying on art metaphors (i.e., jazz) to study improvisation “has its limits” (Hadida et al., 2015, p. 444; Hatch & Weick, 1998; Kamoche et al., 2003, pp. 2031–2032).

As discussed above, metaphorical theorizing is particularly useful when it starts an entire process of theorizing, which ends with models or theoretical insights, rather than when it merely spots similarities. From a social scientific point of view, it is the search for some unifying principles across domains that social scientists should be looking for (Tsoukas, 1991). However, metaphorical

approaches to improvisation stop short of suggesting such models or theories, confining themselves to highlighting surface similarities (see Crossan & Sorrenti, 2002; Cunha et al., 1999; Vera & Crossan, 2004).

Specifically, Mirvis (1998, p. 591) argued that researchers should not only consider the similarities, but *also the differences* between the metaphor they are drawing on and the business environment. Thus, one of the core problems of primarily relying on *one* set of metaphors to study improvisation is that they may restrict researchers to selectively articulate aspects of improvisation that fit into the analogical mould, and to marginalise aspects which do not (see Clegg & Gray, 1996; Hatch, 1999, p. 96; Kamoche et al., 2003, p. 2032; Morgan, 1997, p. 4). This is largely because “metaphors are inherently partial [as they] must emphasize certain features at the expense of others” (Tsoukas, 1991, p. 571), which “always creates distortions” (Morgan, 1997, p. 4). By prioritising the use of metaphors over the actual experience of practitioners (including their emotions and values), explanations of improvisation tend to be in terms of specific metaphors (e.g. jazz, improvisation theatre) and not in terms of how improvisation is experienced by practitioners. This is why Montuori (2003) emphasizes the need for detailed and in depth studies to understand improvisation.

Thus, by focusing on the metaphorical terms, what may be missed is how practitioners perceive their own ‘know-how’ (Ryle, 1945, 1949) or tacit knowledge (Polanyi, 1958) that is utilised to respond to unfolding situations, in their own terms. This is especially important to capture, because adopting appropriate modes of comportment in response to unusual circumstances is by no means a straightforward and generic affair (Shotter, 2017; Shotter & Tsoukas, 2014a; Tsoukas, 2013). Each situation encountered has its own idiosyncrasies, which practitioners must perceive in order to successfully respond (Dreyfus & Dreyfus, 2005; Feldman, 2000; Hadjimichael, 2017; Tsoukas & Chia, 2002). When events are unfolding normally, an experienced practitioner may intuitively respond to them based on cues they have come to know after immersion in a specific setting (Dreyfus, 2002; Dreyfus & Dreyfus,

2005). As illustrated by Yanow and Tsoukas (2009), when the usual flow of events is punctured, practitioners experience a breakdown which forces them to consider how to proceed (see also Barrett, 1998; Dreyfus, 1991; Lok & De Rond, 2013). When facing a breakdown, this evokes diverse emotional reactions which influences which actions are considered (Yanow & Tsoukas, 2009). Put simply, the metaphor approach is not suitable for capturing the process through which agents are able to perceive the necessity and possibility to improvise.

2.3 The Cognitivist Perspective

One of the key contributions of the cognitivist perspective to the improvisation literature is that it has emphasised that both information and knowledge are tied to improvisation (see Bingham & Eisenhardt, 2011; Chelariu, Johnston, & Young, 2002; Miner, Bassoff, & Moorman, 2001; Moorman & Miner, 1998a, p. 15; Vera, Nemanich, Velez-Castrillon, & Werner, 2014). To establish this, research within this perspective has focused upon how individuals process situations in their minds and how this, in turn, leads them to take specific actions as the result of the processing. Two approaches can be distinguished within the cognitivist perspective: the (i) organizational memory approach and the (ii) sensemaking approach. The former focuses on how different types of *memory* (which are implicitly equated to knowledge) influence the outcome of improvisation. The latter focuses on explaining how people *interpret* the situation (i.e., make sense) they find themselves in need to respond to, affects how they improvise.

The emphasis of both approaches is on explaining individual mental activities in relation to improvisational actions. Collective improvisational actions are conceptualized as an *amalgamation of individual improvisational actions* so as to achieve a shared goal. The latter is understood as organizational improvisation (Moorman & Miner, 1998b, p. 70). A seminal example of this, is a case in which while entering a port a large ship could not use its navigation systems due to an engineering problem (Hutchins, 1991, 2010). The situation

did not end in disaster because the crew engaged in a series of local improvisations. Specifically, the navigation team assigned new roles to its members on ad hoc basis which resulted in successfully making the necessary calculations (without computers), with which they guided the ship into the port. Although, not everyone on the ship was aware what the other crewmembers were doing, the fact that all were working towards navigating the ship allowed them to create new routines on the spot, which in turn rescued the situation.

In addition to the above, to a large degree the cognitivist perspective assumes a similar structure of perception/cognition: cognition as a dual processing system. Theories of dual processing maintain that cognition is the result of two processes; an automatic/unconscious process and a conscious/explicit process (Gilovich, Griffin, & Kahneman, 2002). Given the importance bestowed on cognition in relation to improvisation, I will first outline how this perspective conceptualises cognition and later discuss how each approach relates improvisation to cognition.

Cognition in organisations has been imported from cognitive psychology in order to explain a diverse set of processes ranging from intuition to team improvisation through adaptation (see Hodgkinson & Healey, 2008, p. 393). As evident by various publications one may construe that interest in cognitive theories using dual process explanations has risen significantly in organizational theory and is considered instrumental to explaining how people improvise in response to situations (Gilovich et al., 2002; Hodgkinson, Langan-Fox, & Sadler-Smith, 2008, p. 6). This is because, to think of ways to improvise, according to this perspective, necessarily relies on cognition (and cognition itself is considered to be a matter of information processing) (see Moorman & Miner, 1998b). Due to the relevance of cognition and dual-process models to improvisation I will briefly summarize this theory's key points. In the next section I will discuss studies that utilize the latter to explain organizational improvisation.

Dual process theories of cognition get their name from the fact that they accept that two different cognitive systems allow humans to process

information (Epstein, 1994). However, before going into more detail about these systems, it is important to highlight how these systems function. According to Smith and DeCoster (2000), the two processing systems depend on two memory systems - these being long-term memory and short-term memory. On the one hand, long-term memory is defined as a slow process of information storing, in which regularities are established following repeated exposure to a series of experiences over a period of time. Once these regularities are formed they affect the interpretation of any new acquired information. Long-term memory can be further divided into two parts: procedural and declarative memory. Procedural memory stores information of how to perform specific activities. Declarative memory stores information of facts and events, which can be recalled (Kyriakopoulos, 2011; Moorman & Miner, 1998b). On the other hand, short-term memory is seen as a rapid information saving process that creates new representations at the exposure to any experience (see Weick, 2001, p. 72). These two memory systems are interlinked with the two processing systems outlined above (E. Smith & DeCoster, 2000).

Regarding the two processing systems it should be noted that Healey, Vuori and Hodgkinson (2015) highlight that dual process models are referred to using different terminological notions (e.g., system 1 and 2, X-system and Y-system). However, the authors also underline that despite the diverse terminology there is a shared consensus with regards to what the two systems entail. For the purposes of this discussion Healey et al's (2015) terminology for the two cognitive processes will be adopted. The two cognitive processes will be referred to as the X-system and the C-system.

The X-system refers to a process of information processing that operates effortlessly at a subconscious level of awareness. During this process, information is rapidly associated (based on cue salience) with stored representations located in long-term memory (E. Smith & DeCoster, 2000). The C-system refers to a process in which information is processed in a conscious manner that requires effort for retrieving information from either long-term or

short-term memory. It should be noted that the of the C-system requires both motivation as well as cognitive capacity (see Strack & Deutsch, 2004).

Having outlined a basic illustration of how dual processing models explain cognition in the next two subsections I will outline how each approach relates improvisation to cognition.

2.3.1 The Organizational Memory Approach

Within the improvisation literature it has been highlighted that organizations invest a considerable amount of resources in acquiring better information to uncover new knowledge. Hence, it has been argued that what also needs to be focused on is how the stored information and knowledge are utilised in improvisation (Crossan et al., 2005; Majchrzak, Jarvenpaa, & Hollingshead, 2007; Moorman & Miner, 1997, p. 91; Pavlou & Sawy, 2010). In accordance with this view, both practical knowledge such as organisational routines and skills, as well as abstract knowledge of facts or events, constitute organisational memory (Cunha et al., 1999, p. 325; see also King & Ranft, 2001, p. 257). As discussed in the previous section, the first type of knowledge is referred to as procedural memory, while the latter as declarative memory (Kyriakopoulos, 2011, pp. 1058–1059; Kyriakopoulos & De Ruyter, 2004, p. 1470). Both are part of long-term memory.

Both forms of long-term memory are theorised to affect organizational members in two ways: (i) interpretation and (ii) orientation of action (Majchrzak et al., 2007; Moorman & Miner, 1997, p. 93; Vera et al., 2014, p. 11), which has consequences for improvisation. Regarding the former, the availability of stored information and memory has been established to affect how experience is filtered and categorised (Daft & Weick, 1984). Take the example of a jazz artist (Moorman & Miner, 1998b, p. 708). While facing a specific audience and circumstances, through information processing, the artist can associate and interpret their current experience in reference to similar past situations stored in their declarative memory. The association allows the jazz artist to choose a response (or orient their action) from a large repertoire of potential actions that have been stored in their procedural memory. If the other

members of the jazz band also have the same or similar experiences, by taking the lead from the first artist, the band as whole may improvise more effectively (ibid., 708).

Broadly three levels of improvisation are identified by memory scholars (Moorman & Miner, 1998b, p. 703). I will define and discuss each in reference to the examples given by the authors: (i) minor tweaks to existing processes (e.g., rescheduling production plans to meet demands of client), (ii) major tweaks to existing processes (e.g., design of new products that are variations of existing products) and (iii) discard of original processes and creation of new ones (e.g., creation of new product that is inconsistent with organizational strategy). Levels of improvisation have been measured on “three semantic differential seven-point scales” using the following “anchors”: (i) “figured out action as we went along/action followed a strict plan as it was taken, (ii) improvised in carrying this action/strictly followed our plan in carrying out this action, and (iii) ad-libbed action/not an ad-libbed action” (Moorman & Miner, 1998a, p. 10). Environmental turbulence and the level of organizational memory are associated with the level of improvisation. Specifically, environmental turbulence was found to be a positive predictor of the level of improvisation in new product actions, because improvisation is more likely to occur in environments that are unstable. Organization memory was found to have a negative effect on improvisation level. The latter was argued to occur because existing knowledge may restrict creativity in improvisation (Moorman & Miner, 1998a, p. 12).

To shed light on how each type of organizational memory (i.e. procedural and declarative) affects improvisation Moorman and Miner (1998b, pp. 706–707) have theorised (but not empirically investigated) that the level of each type of organizational memory has a differential moderating impact on three outcomes of improvisation (coherence, novelty and speed). Coherence refers to whether actions fit the performance context. Novelty is defined as the degree to which the actions are new. Finally, speed refers to the time required to plan and execute an action.

Procedural memory is characterised by automaticity; consider the nature of knowing how to do things such as riding a bicycle, writing or typing. These activities, like many others can be enacted coherently with little effort upon mastery (Kyriakopoulos, 2011; Moorman & Miner, 1998b). This is because the X-system will instinctively link any current representations in short-term memory with procedural memory in the long-term memory (Strack & Deutsch, 2004). Higher levels of procedural memory are theorized to increase the likelihood of coherent action in improvisation. This is because procedural memory increases the likelihood of having a large repertoire of procedural routines which can be drawn upon and recombined (through the X-system). Higher levels of procedural memory are theorized to increase the likelihood of speedy action in improvisation. This is because procedural memory has an “automatic or tacit quality”, which produces an “economy of action” (Moorman & Miner, 1998b, p. 708; see also Crossan et al., 2005, p. 138). Finally, higher levels of procedural memory are theorized to produce actions low in novelty (see also Cunha et al., 1999, p. 321). This is because procedural memory is argued to restrict actions to the ones that are routinely used (Moorman & Miner, 1998b, p. 709).

Declarative memory is memory of abstract facts. It is not about how to accomplish a specific task, but about what it entails (Kyriakopoulos & De Ruyter, 2004). For instance, it might be about formulating the mathematical formula which describes keeping one’s balance on a moving bicycle, or about “musical theory about chord progressions or rhythmic patterns” (Moorman & Miner, 1998b, p. 710). Higher levels of declarative memory are theorized to increase the possibility of coherent action in improvisation. This is because when improvisers have access to rich repository of declarative memory they are theorized to be capable to recognize patterns in events and select actions that are relevant to the events (Moorman & Miner, 1998b, p. 710). Higher levels of declarative memory are theorized to increase the possibility of new actions during improvisation. This is because declarative memory is assumed to be

more abstract and thus applicable in numerous new ways across a variety of circumstances (ibid., p. 711).

Finally, higher levels of declarative memory are theorized to increase the possibility of lower speed improvisations. Due to the abstractness of declarative memory, it is not associated with a specific use. To identify a relevant fact in declarative memory requires an extensive search which can take time (ibid., p. 711-712). This is because when the C-system is triggered, the association of short-term memory with a relevant fact in long-term memory requires effort and motivation (Strack & Deutsch, 2004). In contrast to the latter, Bingham and Eisenhardt's (2011, p. 1439) theorize that stored explicit knowledge (viz., declarative memory in Moorman and Miner's (1998b) terms) is more effective as it is the basis of cognitive shortcuts. This is because they assume that explicit knowledge entails that an individual has a better understanding of procedures (Bingham & Eisenhardt, 2011, p. 1439).

In another study Kyriakopoulos (2011, p. 1052) explores how procedural and declarative memory "affect the value of improvisation" in the Dutch food industry. The scholar found that high stocks of procedural memory in the presence of improvisation had a negative effect on a firm's market performance. This has been theorized to be because procedural memory may be detrimental when applied to unusual or nonstandard situations as they may not fit the context. The author also found that high stocks of declarative memory while improvising positively affected cost efficiency (Kyriakopoulos, 2011, p. 1067). This is because having rich pool of facts to select from may provide more options to improvise.

In summary, the organizational memory perspective has illuminated the following in relation to improvisation: (i) organizations constantly acquire information and knowledge in their members' long term memory that influence their interpretations and courses of action, which in turn affects the results of organizational improvisation; (ii) procedural memory is associated with improvisational actions that are speedy, coherent but not novel ; (iii) declarative memory can be applied in a range of situations, but is associated with

improvisational actions that are of high novelty but take longer to be conceived and applied.

2.3.2 The Sensemaking Approach

The sensemaking approach is mostly centred around the seminal work of Weick (1979, 1995). Sensemaking refers to the notion that people are beings whose actions are guided by their expectations (viz., interpretations). Because expectations can vary greatly, sensemaking implies that the variability of human behaviour is infinite. To minimize variability in expectation and guide action towards a common goal, organizations institute common labels. When several people share the same labels they are also referred as a “frame of reference”, “collective mind”, “shared mental models” or “expectancy frameworks” (Bigley & Roberts, 2001; Mendonça & Wallace, 2004; Patriotta & Gruber, 2015; Weick, 1993a; Weick & Roberts, 1993). Labels (i.e., information shared in common with other organizational members) are given by organizations to their members in the form of organizational design to allow members to interpret and respond to situations in an organized and coherent way (Weick & Sutcliffe, 2007, p. 153; also referred to as 'typifications' by Patriotta & Gruber, 2015). Responses to expectations through sensemaking are argued to have “a strong element of improvisation” (Weick, 1995, p. 181).

In Weick's (1988) seminal study ‘Enacted Sensemaking in Crisis Situations’, he argues that expectations, commitment and capacity affect both sensemaking and enacted responses (see also Maitlis & Sonenshein, 2010). Enacted responses to crises often feature improvisation (Weick, 1988, p. 314). Each concept will be discussed in turn, then their links will be illustrated and finally each term will be related to an example of improvisation identified in the Mann Gulch disaster (Weick, 1993b).

Expectations (how associating cues creates meaning) (Maitlis & Sonenshein, 2010, p. 564) arise by associating external cues with an individual's internal causal “map of if-then assertions” that contain previously observed consequences (Weick, 1988, p. 307). As discussed above, organizations offer their members labels to allow them to encode their

representations found in short-term memory into labels that facilitate actions aligned with the organizational purpose (e.g., patient as a person who requires treatment) (Weick, 2006, p. 1729). Through the association of cues with labels and long term memory (Weick, 1988, p. 307) individuals “gradually build up confidence about a definition of a situation” (Maitlis & Sonenshein, 2010, p. 564; see also Colville, Pye, & Carter, 2013, p. 1204). Consequently, it is asserted that “action precedes cognition” and that the “organization” as well as “the environment are in the mind of the actor” (Weick, 1988, p. 307; see also Gioia, Corley, & Fabbri, 2002). This position raises onto-epistemological concerns in the form of solipsism – if everything is in the mind of the individual how do we know that it actually exists (Nagel, 1987) (more about this later)? Nevertheless, according to Weick (1988, p. 307) this suggests that responses to crises “are affected partially by previous labels and partially by current context”.

Commitment refers to the reasons for which individuals act in the way they do (Weick, 1988, p. 310). Reasons for behaviour, according to Weick (*ibid.*, p. 310), tend to be “casual” or even “uninteresting” when behaviour is not public. However, it becomes less casual when behaviour becomes public. The latter increases the need for generating explanations for behaviour. Thus, “individuals often generate explanations retrospectively to justify actions to which they have committed” (Maitlis & Sonenshein, 2010, p. 562; Weick, 1988, p. 310). Commitment can often be an important resource to cope with crises. For example, when soldiers got lost in the Alps, they committed to a map which served as the foundation for their actions. Although they successfully found their way, they later discovered that it was actually a map of the Pyrenes (Weick, 1979).

Capacity refers to people’s belief in their capabilities and their response repertoire (Weick, 1988, p. 311). The more things individuals think they can do, the more responsive they can be to a wider variety of inputs. This epitomizes Weick’s (*ibid.*, p. 311) assertion that capacity affects the perception of what “people feel they have the capacity to do something about”. It is argued that

increased exposure to situations increases the likelihood that an individual will see a specific change that needs to be made to cope with a crisis. Therefore, expertise built up through exposure to wide variety of situations is seen as means for identifying key events. Narrow expertise (i.e., when one is not exposed to variety of situations), however, is seen as detrimental because individuals may miss the broader picture by being fixated on cues that they are familiar with. The above suggest that interpretations about a situation tend to be in terms of the existing frames of reference, which creates a *cycle* of self-fulfilling prophecies (Plowman et al., 2007; Weick, 2006, p. 1729). People retrospectively rationalise their improvisations in terms of what they think the situation ought to be like, based on their preconceptions.

Before illustrating all three concepts (expectations, capacity and commitment) in an example I will summarise them together. From the above, during the enactment of an improvisation, a person is portrayed to make sense of it retrospectively. As illustrated by the notion of expectations, an action occurs first, and only then do people associate cues with expectations. This is because external events are encoded in the short-term memory of agents in the form of representations. Depending on the level of one's experiences, they will have different information which they deem to be relevant, stored in their long-term memory to which the representations are associated with (either by the X or C system). By drawing on long-term memory they are likely to access causal maps. Causal maps are "if-then assertions" which relate to how a person expects the current situation to be, based on previous experiences, and what to expect in the future. When faced with an unusual situation, a person will draw on their most relevant causal maps that will ultimately guide their responses to the situation. Responses to expectations are influenced by the capacity of the individuals based on their preconceptions. Finally, when dealing with a crisis, agents often generate an explanation about their commitment and actions retrospectively. Hence, Weick (1993a) posits that "people act their way into meanings when they try to explain elapsed actions."

To illustrate expectations, commitment and capacity during improvisation I will refer to the example of the Mann Gulch disaster (Weick, 1993b). A group of firefighters was dispatched to extinguish a fire in Mann Gulch (Montana, US). They were flown to the site. On the way, they heard over the radio that it was a “10:00 fire” (ibid, p.635). This term was a *label* developed in the organization that signified that it is the type of fire which could be controlled by 10AM of the following morning. Therefore, on arrival the firefighters responded to the situation in line with the *expectations* evoked by the label – so they took it easy.

However, after a while they realised that the fire was not behaving in the way they expected it to be – it was rapidly advancing towards them. During this phase they could not make sense of what was occurring. Panic was argued to inhibit sensemaking processes that would allow the firefighters to recognize what to do (ibid, p. 637). One group trapped by their *commitment* to organizational frames of reference tried to outrun the fire without dropping their equipment (abandoning equipment was not recommended). This resulted in 13 deaths. Dodge the formal leader of the unit, managed to break free from the unit’s *commitment* to organizational frames of reference, and utilised his prior understanding of how fire spreads to save his life. Thus, the latter served as a justification for improvising by dropping his equipment and lighting an escape fire in front of the unit, which he unsuccessfully ordered to join him. Belief in the escape fire working, illustrates how *capacity*, seeing what changes can be made, is tied to expectations from the stored causal maps of fire behaviour. It should be noted that Weick (1993b, p. 638) argues that Dodge did not experience panic because he assumed that he had his group under control. Beyond panic, however, other emotions are not discussed.

It should be noted, however, that some scholars have criticized the Weickian account of sensemaking and its ensuing conception of improvisation (Holt & Cornelissen, 2014). Adopting a Heideggerian perspective, Holt and Cornelissen argue that one’s sense is attuned to the environment through moods. Moods are implicitly equated to emotions about the state of affairs. In

their study, the authors specify that “the fear felt at Mann Gulch, for example, is a mood” (ibid., p. 534). A distinction, however, between moods and emotions is not offered. Indeed, emotions are not alluded to at all. Neither, are moods discussed in relation to practices. Nevertheless the authors maintain that moods reveal the world under a certain prism. This is because by drawing on Heidegger they suggest that the way an agent exists is an issue for them. Because of the latter, agents press forward into possibilities of being based on how their mood colours their existence. For example, in the Mann Gulch disaster panic coloured the world for the firefighters as frightful. This in turn opened possibilities for them such as running away, or improvising by lighting an escape fire. Thus, given that moods open possibilities about the future, this counters Weick’s central claim that sensemaking is retrospective. It suggests, instead, that sense is future-oriented through attunement with moods (ibid., p. 533). This line of argumentation has been encouraged by other scholars who argue that further research should focus on explaining how agents make sense prospectively in unfolding situations, which are not necessarily crises (Sandberg & Tsoukas, 2015, p. S25).

In summary, the sensemaking approach has offered the following insights regarding improvisation: (i) improvisation depends on the expectations of individuals, (ii) expectations and justifications for actions are usually made retrospectively since “action precedes cognition” (Weick, 1988, p. 307), (iii) expectations of individuals are tied to shared frames of reference through labels, (iv) which may create differential beliefs in capacity depending on (v) people’s causal maps and, thus experiences.

2.3.3 Critique of the Cognitivist Perspective

In comparison to the metaphor perspective, where most of the material came from beyond conventional organizational settings, the cognitivist perspective has allowed the organizational improvisation literature to focus more specifically on improvisation within conventional organizations. However, it gives rise to the *information processing controversy* (which will be explained later). As will become evident below, some Metaphor studies

(Kamoche & Cunha, 2001; Kamoche et al., 2003; Vera & Crossan, 2005) and many Cognitivist studies accept that the way agents improvise by processing information in their minds.

By drawing on the metaphor of the computer, many scholars differentiate between procedural and declarative memory, which they claim to be the *equivalent* of tacit and explicit knowledge (Kyriakopoulos, 2011; Moorman & Miner, 1998b; see also Bingham & Eisendhardt, 2011). However, if one examines the assumptions of dual process systems through Merleau-Ponty's (2012) counter-empiricist argument [which will be briefly outlined below by drawing on Matthews (2006)], one may be able to see that the cognitive explanation of intentionality (i.e. perceiving and experiencing) should not be considered adequate. To do so, the philosophical foundations of dual-process models will be outlined and discussed in relation to Merleau-Ponty's (2012) critique of empiricism. This has important implications for the suitability of using dual information processing to explain organizational improvisation.

According to Matthews (2006), cognitive process models are descendants of the empiricist philosophical tradition (see also Merleau-Ponty, 2012; Morris, 2012; Varela, Thompson, & Rosch, 1991). This is because both traditions accept that perception is passive and that the individual is distinct from their environment. These two assumptions are of paramount significance to both cognitivism and empiricism. This is because passive perception guarantees that people have access to the outside world via their perception. Because perception is assumed to be passive, this is seen to guarantee that it does not distort how the external world actually exists. As such, claims that empirical data are valid and reliable are seen to be guaranteed by the acceptance that the individual passively perceives the external environment (Merleau-Ponty, 2012). However, if one scrutinizes the way by which perception is explained by both cognitivism and empiricist philosophy, one would see that their explanations are circular (Matthews, 2006). Given the fact that empiricist philosophy is beyond the scope of this thesis, a short examination of the

argument of cognitivism will be outlined. As shown above, cognitivism relies heavily on the processes of association and memory to provide explanations. As such, both these two constructs will be examined.

Association is seen as the means by which different representations are linked with other representations in order to provide a coherent stream of consciousness in one's mind (Matthews, 2006; Merleau-Ponty, 2012; E. Smith & DeCoster, 2000). However, accepting that perception is passive, that is representations come to mind based on cues from perception - how does association occur between supposedly distinct representations? One could say cue salience, but if perception is passive, how could cue salience account for association? Cue salience would imply an active role of perception. If one accepts an active role of perception, the foundations of the cognitivist perspective would be at risk because one would not have a basis to show that what one is perceiving actually exists as it is (Varela et al., 1991). Therefore, one can see that associating distinct representations does not guarantee a coherent way of explaining how one makes sense of any situation (Taylor, 2005, pp. 30–31). This is because coherence “is already presupposed in our ability to associate” (Matthews, 2006, p. 30; Merleau-Ponty, 2012, p. 18).

Alternatively, one could turn to the construct of memory to explain why one perceives a situation as a meaningful and unified whole. Specifically, one could say that because s/he encountered something similar in the past, s/he is enabled to perceive a similar situation in the present under a similar light. However, again this is also a circular argument. If memory is given the role of affecting current experiences, this assumes that memory is organised in a similar manner in all previous experiences (Matthews, 2006, p. 30). So, if one revisits the first time they perceived something, how was that experience organised as a coherent and meaningful whole without prior experience to organize it? And given the latter, how is that first experience supposed to be the basis of all subsequent similar experiences (ibid, p. 30)?

If the above problematization about the underlying assumptions of association and memory that form the basis of dual process models is accepted,

one can see that explanations suggested by theories relying on the above foundations would be problematic. This is because they do not seem to account what they claim to be explaining: how people perceive the world in a way that is meaningful which allows them to engage in improvisation (Moorman & Miner, 1998b; Vera & Crossan, 2005; Vera et al., 2014). This suggests that the lived experience of improvising is not fully understood. This is an important issue because it can shed light on how improvisation is experienced and enacted. Apart from this limitation, additional major inconsistencies have infiltrated the improvisation literature through dual process explanations and their treatment of memory.

Specifically, memory and knowledge are, sometimes, assumed to be identical (Kyriakopoulos, 2011; Moorman & Miner, 1998a, 1998b) and that action precedes cognition (Gioia et al., 2002; Maitlis & Sonenshein, 2010; Weick, 1988). Memory and knowledge are not necessarily the same. As it is portrayed in the improvisation literature (Kyriakopoulos, 2011; Moorman & Miner, 1998b), the term memory entails having recollections of past occurrences that are then associated via mental processing (E. Smith & DeCoster, 2000) with current situations. These in turn, enable practitioners to respond in the same way as they did in the past. In addition, according to Weick (2001), a person can only make sense of their actions after s/he has performed them by revisiting their experience. This implies that when a person is knowledgeable or makes sense of a situation, they increasingly respond to their internal representations found in memory and less to the cues that are presented to agents in unfolding situations (Dreyfus, 2007a; Gibson & Gibson, 1955a). Hence, due to the implicit assumptions of this approach, past-experience is considered to be more important than present experience.

However, recent studies cast doubt on this conception (see Dane, 2011). Extant studies on the acquisition of expertise point towards the importance of lived experience (i.e., perception) which is underexplored in this approach. Dreyfus (2002) argues that when one becomes an expert in a skill, what distinguishes them from a novice is that they unreflectively perceive subtle

nuances of situations which allow them to react differentially (Ribeiro, 2014; Rietveld, 2010; Rietveld, de Haan, & Denys, 2013; Rietveld & Kiverstein, 2014). “For we do not react to objects in any single uniform way. We respond and relate ourselves to them in different ways in different circumstances” (Shotter, 1996, p. 304).

Knowledge is seen as the expert’s ability to perceive finer distinctions in each situation which in turn allow one to react in a different way depending on present circumstances (Benner, Hooper-Kyriakidis, & Stannard, 1999; Dreyfus, 2007a; Dreyfus & Dreyfus, 2005; Selinger, Dreyfus, & Collins, 2007). In a laboratory experiment on perceptual learning, conducted by the founders of the ecological approach, James and Eleanor Gibson (1955a, p. 40), it is shown that “repetition or practice is necessary for the development of the improved percept, but there is no proof that it incorporates memories”. Thus they suggest that “perceptual learning consists of responding to variables of stimulation not previously responded to” (Gibson & Gibson, 1955b, p. 448). Nearly fifty years later, the neuroscientist Walter Freeman (1999) offers supports to these findings. By studying the functioning of the brain of how mammals learn different skills, he found that there is no evidence that the body’s neural networks correlate information gathered from the outside with information stored in the brain.

Similarly, Suchman (2007, p. 70) highlights that in contrast to the dominant cognitivist view that people simply implement memorised abstract rules to take action, every course of action depends on a person perceiving the unique material and social circumstances. Beyond the silence in the memory studies and Weick’s sparse references to some emotions (e.g., panic), as well as Holt and Cornelissen’s (2014) allusion to moods, the literature largely overlooks emotions. This is counterintuitive as everyday experience suggests that during actions we often feel emotions. Although Holt and Cornelissen (2014) do not delineate between emotions and moods, it is to their credit that they have conceptualized responses to situation to also entail responding to an agent’s mood. Being in a certain mood is argued to make salient some

interpretations of the situation and make certain responses more likely over others. In other words, Holt and Cornelissen suggest that knowledgeability entails being more responsive to the situation itself. As a result, knowledge cannot be seen as identical to memory, because an expert never reacts in the same manner, or to the same stimuli (Benner et al., 1999).

By contrast, the expert reacts to different cues each time based on the perceived circumstances (Freeman, 1999; Holt & Cornelissen, 2014; Varela et al., 1991) and their emotional reactions to them (Solomon, 2007). Hence, how could action precede cognition as claimed by Weick (1988, p. 307), if one differentially responds to stimuli on an ad-hoc basis? Action before cognition is impossible, for cognition is the basis for action (Merleau-Ponty, 1964). The person needs to be immersed in their environment to respond appropriately (Ingold, 2002). One does not draw *only* on their past experience to identify the appropriate response based on cues from the environment. One must, draw on both their experience and their perception of the environment to adapt their responses to suit the circumstances (Sandberg & Dall’Alba, 2009; Sandberg & Tsoukas, 2011, 2015). Therefore, the separation of mind and environment implicit (and its passive relationship) in the disjunctive paradigm cannot explain how one can engage in an action by drawing on both their understanding of its unique circumstances as well their own experiences.

By characterising procedural memory as a ‘representation of tacit knowledge’, and declarative memory as an abstract, factual type of knowledge (Kyriakopoulos, 2011, p. 1058; Moorman & Miner, 1998b, pp. 708, 710) a false epistemological dichotomy is introduced (Tsoukas, 2005, pp. 384–386). As signified by Polanyi (1958; Polanyi & Prosch, 1977) and underlined by Tsoukas (2011a), tacit and explicit knowledge are *not* two separate types of knowledge which are ‘contingently linked, rather, they are mutually constituted - like two sides of the same coin’ (Tsoukas, 2005, p. 386). This is because embeddedness in a social sphere of meaning is unavoidable (Dreyfus, 1989; MacIntyre, 2007; Toulmin, 1992) and tacit knowledge is sculpted by this embeddedness (MacIntyre, 2007; Polanyi, 1958, Chapter 7; Toulmin, 1992). Tacitly taking for

granted this sphere, is the context that gives meaning to even the most explicit facts (Dreyfus, 1991; Heidegger, 2013; Schatzki, 2005). For example, making sense of differential equations depends on one participating in the practice of mathematics in which one takes for granted certain assumptions, so as to make sense of the equations. But participating in the practice of mathematics rests on there being a cultural understanding of mathematics. For if no one knew about mathematics, how could one practice them? Hence in the case of differential equations one attends from the tacitly held assumptions (cultural and practice-based), to seeing the meaning of the equations (Gueldenberg & Helting, 2007; Polanyi, 1962b; Tsoukas, 2011a).

Thus, by accepting that tacit knowledge is separate from knowledge of facts, is to suggest that factual knowledge is separate from shared sociomaterial practices. In other words, one is asserting that sociomaterial embeddedness is not required for perceiving meaning, and facts are endowed with meaning by individuals that function as lone information-processors who can have a private language (see Taylor, 1985, pp. 2–8, 1995, Chapter 4). However, following the work of Wittgenstein (1986, §243-271), the aforementioned possibility has been shown to be an impossibility (see also Castoriadis, 2005b; Dreyfus & Taylor, 2015; Merleau-Ponty, 2012; Taylor, 1995, Chapter 4,6). Otherwise, accepting such a subjectivist epistemology “threatens us with anarchic relativism, the assertion that knowledge is whatever we imagine” (Spender, 2008, p. 170). Hence, adopting the disjunctive (i.e., atomistic) onto-epistemological view proposed by the cognitive approach in order to interpret improvisation, risks overlooking the complexity of the phenomenon of interest (Tsoukas, 2017). Namely that if improvisation is tied to knowledge, then it relies on know-how which relies on perceiving and dwelling in an overarching cultural nexus of meaning. Consequently, improvisation is never purely an individual accomplishment – an accomplishment separate from the sociomaterial environment. One relies on the meanings that exist in the sociomaterial practices that one is part of in order to take any action

(Castoriadis, 2005b; MacIntyre, 2007; Tsoukas, 2005, Chapter 16; Wittgenstein, 1976).

2.4 The Sociomaterial Perspective

The term sociomaterial refers to the notion of how individuals in relation to material and social structures are enmeshed across different settings (Davis et al., 2009; Nicolini, 2011, 2012; Spencer, Murtha, & Lenway, 2005). Material structures refer to the raw materials, tools and equipment individuals use to accomplish an activity (e.g., hammer for driving nail). The social structure is understood as the overarching patterned social conventions that is the source and basis for all individual action. Jointly material and social structures form Practices. According to Yanow and Tsoukas (2009, p. 1347), a Practice is characterised by three features. One, it involves cooperation that is temporally bounded by rules. Two, it seeks to achieve internal goods, which is an outcome only produced by participating in the specific practice. Three, practitioners ineludibly seek to achieve the practice's "standards of excellence" (it should be noted that this interpretation of Practice draws heavily on MacIntyre, 2007). By adopting the view that activities derive their meaning from social nexuses, the Sociomaterial perspective has managed to move beyond the individualist bias found in the cognitivist perspective (e.g., Duymedjian & Rüling, 2010).

While most studies in this perspective refer to both social and material structures, some tend to offer explanations of improvisation by leaning more heavily on one of the two. For example, as will be discussed below, Bechky and Okhuysen (2011) focus on social structures to explain improvisation, whereas Baker and Nelson (2005) focus mostly on material structures. Although the terms structure/practice can trace their lineage to Giddens (1984) and Bourdieu (1990), the discussion of this section will be restricted to the studies that focus on improvisation/bricolage. The primary goal is to understand how social and material structures are discussed by the latter studies when referring to improvisation/bricolage. Most of these studies rely on in-depth case studies of organizational improvisation. Like the other perspectives, improvisation is

shown to be necessary when organizations are faced with uncertainty and change (S. Brown & Eisenhardt, 1995; Eisenhardt & Tabrizi, 1995; Orlikowski, 1996).

In one of the most seminal studies of the perspective, Bechky and Okhuysen (2011) empirically demonstrate how the organisation's socio-cognitive resources (roles and routines) affect how their members improvise (see also Cunha, Cunha, & Clegg, 2009). By using ethnographic data from a police SWAT team and film production crews, they suggest that practitioners respond to unusual events by relying on the structurally sculpted process of organisational bricolage. Bricolage, a French term is often used *interchangeably* with improvisation. It originates from the work of structural anthropologist Lévi-Strauss (1966) and is defined as an improvised reorganisation of available resources in order to respond to situations (see also Duymedjian & Rüling, 2010).

Bechky and Okhuyesen (2011, pp. 246–249) argue that the studied teams exhibited three bricolage behaviours. First, they noticed that team members engaged in role shifting (viz., substituting someone at performing a task). For example, one day while observing the film crew, the operator of the aerial camera did not show up for work. Thus, another camera person fulfilling a different role was asked to take over. Second, the authors noticed that SWAT team members reorganise routines (viz., change of goals and shift of routines to achieve new goal). For example, as the unit was about to place explosives to blow up a door, a member noticed that the door was unlocked. Consequently, the unit employed another routine called “stealth entry”. Finally, the authors noticed that the film crew members engaged in reordering routines (viz., change of task sequence). For example, when a lead actor was unwell, the director chose to shoot other scenes in which the actor was not required, and return to the missed scene later.

Bechky and Okhuysen (2011, p. 258) maintain that all three bricolage behaviours discussed above, arise because of the socio-cognitive resources that the organizational structures produce. They highlight that for organisational

bricolage to be enacted, presupposes a period in which practitioners are shaped by organisational norms over interaction. That is, the agents developed shared knowledge of a repertoire of organizational routines and roles. By drawing on the repertoire agents were able to improvise by switching between roles and routines, depending on the situation.

Although, this explanation is valuable in the sense that it highlights the role of the organisation as a “platform” (Ciborra, 1996) for the socio-cognitive resources agents draw upon to improvise, it marginalizes material resources, overlooks emotions and downplays human agency by emphasizing social structuration (cf., Sonenshein, 2014). Bechky and Okhuysen’s explanation of improvisation assumes that agents mostly *recycle* organizational socio-cognitive resources. Although, routines have an ostensive (i.e., pre-defined structure) as well as a performative aspect (i.e., actions of agents), agents do not simply recycle resources to cope with situations as a natural consequence of what is already in place by the structure (Feldman & Pentland, 2003). Put otherwise, neither resources nor situations come with a priori labels. An agent’s judgement is required to view something under a particular prism (Tsoukas, 2018a, p. 9). Agents do not have a *fixed/pre-set* repertoire for action (Feldman, 2000, 2004). Moreover, agents can creatively borrow aspects *from other social settings* and thus create new responses (Parmigiani & Howard-Grenville, 2011, p. 435; see also Tsoukas & Chia, 2002).

Indeed several studies on bricolage focus on how individuals re-create (Baker & Nelson, 2005; Halme, Lindeman, & Linna, 2012), re-frame (Kannan-Narasimhan & Lawrence, 2018) or combine (Garud & Karnoe, 2003) resources beyond the restrictions of sociomaterial structures. A seminal study underlying the point that agents do not recycle ready-made resources was conducted by Baker and Nelson (2005). They argue that an organization’s environment far from being an “objective ecology” (ibid., p. 331) is “idiosyncratic”. That is, “there is a wide scope for judgement” (ibid., p. 332). From the launchpad of this insight, the authors focused on how material resources were recombined by different organizations for new purposes when faced by “resource constraints”.

Across the studied organizations the authors found that they were able to improvise through novel combinations of material resources insofar as there was a “general awareness of existing practices and norms and a conscious willingness to abrogate them” (ibid., p. 342). It should be noted, however, that in most of the above studies, bricolage is described as the result of a rational response (Visser et al., 2018, p. 356), thus overlooking the role of emotional experience and organizational values in the process.

Beyond the focus on improvisation/bricolage within the material structure exemplified by Baker and Nelson (2005), other studies have shown that improvisation depends on the imaginative (and in some cases arbitrary) re-interpretation of the existing sociomaterial structure, in a manner that was not previously predetermined. Re-interpretation can be achieved narratively/discursively (Illia & Zamparini, 2016; Spicer & Sewell, 2010), intentionally (i.e., through conscious selection of which resources fit agents’ values) (Perkmann & Spicer, 2014) or unintentionally (an unforeseen consequence of agents’ actions) (Lamberg & Pajunen, 2010). Pre-established structures cannot accommodate the mutation and complexity of everyday social life that inevitably leads to facing novel situations (Hadjimichael, 2017; Tsoukas, 1998b). Hence, scholars have argued that routines are in a constant state of flux, because standardised routines cannot always attain their intended goals (Tsoukas & Chia, 2002).

Consequently, actions of organizational members do not always strictly follow the organizational structure even in high-reliability organizations (Weick, 1990, 1993b). Brady (2011), for example, describes how the Russian General Vasily Chuikov *overtly* improvised to change the tide of the war. By the time of the battle of Stalingrad during World War II, the Russian army had been on the retreat for months. This was largely due to the superior equipment and novel tactics of the German army. Indeed, the tide of events was so stark for the Russians that they were on the brink of collapsing by the time the fight reached Stalingrad (ibid., p.37). Under the strict guidelines of Stalin: “not a step

back”, General Chuikov had to find a way to motivate his demoralised and ill equipped troops to hold their ground (ibid., p.41).

While in command of the 62nd Russian Army, Chuikov noticed that Germans did not favour hand to hand combat and fighting at night. Additionally, Chuikov realised that when Russians were close to the Nazi lines, the Nazi artillery and air force were reluctant to fire (ibid., p.38). By taking these observations into consideration General Chuikov decided to reorganise his troops in small semi-autonomous groups. This was later referred to as the ‘storm group tactic’. This tactic relied on the utilisation of small groups of lightly armed soldiers to attack enemy controlled buildings in three successive waves to capture them. This was a major deviation from the norm because until October 1942, Russian offensive or defensive operations were usually organised in the standard groups of regiments and battalions. By ceding central control to small semi-autonomous groups, General Chuikov managed to gain an advantage over his Nazi adversary Field Marshal Friedrich Paulous and eventually win the battle. General Chuikov’s improvised tactic was subsequently used in other battles and influenced the developments in the German Eastern Front.

In fact, normative directives of sociomaterial practices are sometimes evaded by hiding in the organizational underlife. The organizational underlife is defined as the informal activities of staff, which are performed in secret because they are beyond the organizational structure and policies (Giustiniano, Cunha, & Clegg, 2016, p. 228). An ethnographic study of a British medical emergency unit has shown that underlife improvisations are not necessarily harmful (Batista et al., 2016). On the contrary, deviating from uniform protocols to deal with “non-uniform problems” of a patient is portrayed to be necessary in the practice of the unit (ibid., p. 416). This is because blindly following the official/generic protocols in all situations, would limit the care for patients who have unique problems.

Each situation has singularities and nuances that cannot be captured in abstract rules. Improvisation is required to bring together abstract protocols to

grounded problems (Clegg, Cunha, & Cunha, 2002, p. 489). In Batista's et al. (2016, p. 419) study, given that improvisation is not understood to be dictated by organizational protocols, the authors argue that improvisation is tied to tacit knowledge as a form of intuition. Intuition is defined "as improvising that implicitly (or even unconsciously) benefits from previous actions" (ibid., p. 410). However, beyond maintaining that tacit knowledge is a spontaneous synthesis of past and present experience, the exact mechanism of how the latter occurs is not focused on.

In summary, the sociomaterial perspective has allowed the following insights in relation to improvisation: (i) improvisation is not a strictly individual affair, (ii) improvisation happens in relation to collective standards or conventions, (iii) improvisation can occur overtly or covertly depending on whether it complies or deviates from the instituted collective standards or conventions.

2.4.1 Critique of the Sociomaterial Perspective

Most of the above studies suggest that people improvise by depending on (e.g. Bechky & Okhuysen, 2011), ignoring (e.g. Baker & Nelson, 2005), or avoiding (e.g. Batista et al., 2016) sociomaterial structures. Whether organizations/agents improvise by complying or rejecting (overtly or covertly) sociomaterial structures, scholars agree that there is need for creativity and situational responsiveness. While sociomaterial studies attempt to move closer to lived experience of improvisation by bringing to the fore the ongoing relationality of human activities with sociomateriality, they do not consistently focus on lived experience itself (see Fisher & Barrett, 2019; for a similar point see Sandberg & Dall'Alba, 2009, p. 1351). This is detrimental to understanding organizational improvisation as it has been highlighted that "real time experience on action is the defining characteristic of improvisation" (Miner et al., 2001, p. 316).

Real time experience is characterized, to a great extent, by perception (Gibson, 2015a; Ingold, 2002; Merleau-Ponty, 2012). In turn, perception is largely coloured by tacit knowledge (Hadjimichael & Tsoukas, 2019; Ribeiro,

2014) and emotional experience (Frijda, 2009; Solomon, 2007). As argued above, the development of agents' tacit knowledge is entwined with sociomaterial practices and permits them to intuitively respond, or identify solutions to unexpected developments (Tsoukas, 2011a). Participating in the sociomaterial context not only allows agents to hone their perception of contextual nuances, but also entails developing a sensitivity to the ends valued by their practices (Nicolini & Monteiro, 2017). In parallel, emotions entail judgements about unfolding developments based on the valued ends (Nussbaum, 2009). Deviation from values garners emotional tension, which in turn is argued to offer the motivation to respond to situations (Frijda, 2010b). As organizational improvisation entails responding to contingencies and moods (Holt & Cornelissen, 2014), based on the ends valued in practices (Nicolini & Monteiro, 2017), the sociomaterial perspective must pay closer attention to emotions, moods and tacit knowledge.

While improvisation is not at the centre of Yanow and Tsoukas (2009) study, the authors influenced by Dreyfus (1991), offer the beginnings of a sociomaterial explanation of improvisational behaviour that pays direct attention to lived experience (including tacit knowledge and to a limited extent, emotions). Specifically, they argue that for a person to be a good practitioner, they must become skilled. This, they contend, can only occur by expending time and effort in developing habitual responses to variety of situations that comply with the standards of their practice. When mastery is attained, responses are enacted spontaneously. Spontaneous reactions are tied to tacit knowledge, which is essentially described as a type of non-cognitive background awareness that orients people towards certain courses of action (Tsoukas, 2011a). As such improvising in the face of various situations becomes a natural part of being a skilled practitioner - a person displays "a range of responses when they encounter disturbances at work, from absorbed coping to analytic reflection" (Raelin, 2007, p. 500).

In each situation, both emotional and mental reactions are triggered by the context offering "unplanned and non-rational" backtalk (Yanow & Tsoukas,

2009, p. 1348). Thus, in a sense this explanation of improvisation implies that the social structure is a taken-for-granted referential background from which the individual attends from. Therefore, the structure and agent are mutually constituted: the one becomes a part the other (they do not exist separately). This unreflective awareness allows agents to either intuitively respond to situations, or to reflect on them by *perceiving* what is termed to be “common sense” (i.e., normal or abnormal circumstances). What is common sense and how does it come about? As Chia (2002, p. 866) eloquently put it: “the organization is a censoring/centring device that works to create a figure/ground effect so that attention, focus and purposefulness are directed towards productive outcomes”, but of course is not exhaustive. In the next chapter, I will draw on Yanow and Tsoukas’ (2009) theorization to elaborate how it can assist in further theorizing about organizational improvisation.

2.5 Discussion

This section seeks to critically examine the contribution and the limitations of studies across the three identified perspectives. Particular emphasis will be paid to explicating the onto-epistemological (viz. metaphysical) assumptions that underlie the claims (see Alvesson & Sandberg, 2011). This is important because theories are inherently underlain, explicitly or implicitly, by metaphysical assumptions (Harré, 1985). Metaphysical assumptions are manifested in a theory’s choice of fundamental concepts and the relationship assumed between them (ibid., p. 100). The relation between concepts create “systems of picturing” (ibid., p.16). As Wittgenstein (1986, §115) aptly pointed out, pictures can hold us “captive”. To cast off the shackles of metaphysical pictures one must explicitly identify their underlying assumptions (Harré, 1985, p. 17). That is not to say that someone can attain a ‘view from nowhere’ (Nagel, 1986), as all understandings “imply metaphysics” (Camus, 1979, p. 10). Rather, if I may borrow Nietzsche’s analogy, the point is to become cognizant of which chains one chooses to dance in (see Ortmann & Sydow, 2018).

As discussed above, the three perspectives have generated important insights for understanding of improvisation. Nevertheless, studies across the perspectives are differentially underlain by three onto-epistemological controversies that limit our understanding of improvisation. While some onto-epistemological have already been discussed in relation to each perspective in their respective critiques; in this section I will focus on onto-epistemological controversies that can be found across the three perspectives. These being: (i) the separability controversy (i.e., whether improvisation can be understood in terms of distinct components); (ii) the outcome/process controversy (i.e., whether improvisation is understood as an outcome or a process); and (iii) finally, the functionalist controversy (i.e., whether improvisation can be understood strictly in terms of its function). I expand on each controversy below.

2.5.1 The Separability Controversy

This controversy underscores the tendency of various studies across the perspectives to understand improvisation and other related constructs in terms of a disjunctive theoretical approach (Tsoukas, 2017). The disjunctive approach seeks to *abstract* social phenomena from their settings and dissect them into *separable* components with the aim of signifying *quasi-causal* relationships between them. A strong form of this approach would urge scholars to utilise a positivistic epistemology and an objectivistic ontology (see Tsoukas, 2012). A positivist epistemology concedes that knowledge about society should be produced deductively, akin to mathematics and that the knowledge produced should enable scientists to make predictions (Harré, 1985, pp. 53–57). Objectivist ontology concedes that human agents and their societies are akin to natural phenomena. That is, like natural science understands that the emergent properties of the human body (e.g., perception) can be gradually attributed to configurations of molecules, so improvisation should be analysed in terms of underlying factors (ibid., pp. 128-133).

The combination of the positivistic epistemology and objectivist ontology makes the disjunctive paradigm liable to three main assumptions (see

Tsoukas, 1997). First, it implies studying social phenomena (including improvisation) as *reducible* to separable entities that are quasi-causally related through general laws (i.e., it adopts an atomistic ontology). Secondly, it accepts and seeks to emulate the notion that the entities that underlie social phenomena (including improvisation) are subject to *general laws* similar to the way natural phenomena are found to be in the natural sciences (Harré, 1985). Thirdly, as knowledge about social phenomena is supposed to be understood in terms of generalizations, it follows that knowledge of improvisation should be *abstract*, and therefore separate from the colloquial understandings of people because the essence of phenomena is not as it *prima facie* appears.

The three above assumptions are adopted to *varying degrees* across different studies of the three perspectives. Dissecting improvisation into discrete entities that are subject to abstract general laws will be classified as adopting a *strong disjunctive paradigm*, dissecting some aspects of improvisation into discrete entities that may not always be subjected to generalizable laws will be classified as a *weak disjunctive paradigm*. While understanding improvisation in terms of relational holisms that may be understood via colloquial conceptualizations will be classified as rejecting the disjunctive paradigm or using a *conjunctive paradigm* (see Tsoukas, 2017).

Several metaphor studies adopt a strong disjunctive paradigm by seeking to postulate identified insights about improvisation, by separating improvisation and other related constructs in terms of antecedents, influencing factors and outcomes (Cunha et al., 1999; Kamoche et al., 2003). For example, Vera and Crossan (2004, p. 733) embrace the disjunctive paradigm to such an extent so as to propose “that improvisation can be modelled as a latent construct with two dimensions: spontaneity [whether time is scarce] and creativity [whether the improvisation is novel]”. Other scholars point out that antecedents to improvisation include social structures (e.g., experimental culture, supportive culture) and technical structures (e.g., expertise) (Cunha et al., 1999, p. 318; Kamoche et al., 2003, p. 2026; see also Kamoche & Cunha, 2001). Parenthetically, this illustrates the assumption of the separation between social

structures and skills. This goes hand in hand with the fact that other scholars also separate between individual and collective levels of analysis (see Crossan & Sorrenti, 2002). Moving on, moderating factors between improvisation and innovation include expertise, teamwork quality, experimental culture and real time information. Training was found to increase the frequency and quality of improvisation (Vera & Crossan, 2005, p. 219). In addition, other influencing factors identified by Cunha et al. (1999, p. 321) include leadership, member characteristics and resources. Finally, outcomes include innovation, improvisation frequency and quality (ibid.), learning and flexibility (Kamoche et al., 2003).

Most studies in the Cognitive perspective either adopt a strong or a weak version of the disjunctive paradigm. Some studies view information processing as the basis of how individuals improvise. Information processing is often dissected in terms of its constituting elements e.g. memory (and by extent knowledge) is dichotomized in terms of procedural and declarative (Kyriakopoulos, 2011; Kyriakopoulos & De Ruyter, 2004; Moorman & Miner, 1998b), and in turn are quasi-causally related to other outcomes such as improvisation novelty, speed, market performance and cost efficiency. Adoption of a weak disjunctive paradigm can be found in studies that do not dissect all aspects relating to improvisation into entities and do not necessarily accept that these phenomena can always be understood in terms of generalizable laws. For example, some scholars differentiate between the individual and the world [e.g. Weick (1988, p. 307) notes that “the organization is in the mind of the individual”, humans have representations of the external world], or between tacit and explicit knowledge (e.g. King & Ranft, 2001).

In the Sociomaterial perspective, most studies adopt a weak disjunctive paradigm. This is because most studies implicitly assume the duality of the individual and the structure (with the exception of Davis et al., 2009). Like the duality of the cognitivist perspective where the person’s mind is portrayed to be distinct from the external world, here the individual is portrayed to be in relation to a social structure. In various studies agents are portrayed to either

improvise in accordance or contrary to sociomaterial structures. This was evident in discussions of the organizational underlife (Batista et al., 2016), and how agents draw on their organizational, or broader sociomaterial structures (Bechky & Okhuysen, 2011; Davis et al., 2009; Illia & Zamparini, 2016; Spencer et al., 2005).

Only a handful of studies across the perspectives appear to completely reject the disjunctive view. Such studies focus on understanding improvisation in terms of relational holisms. That is, they do not dissect improvisation in terms of distinct contributing factors. Improvisation for them can only be understood by taking into account the wider context in which the phenomenon occurs (e.g., Holt & Cornelissen, 2014; Yanow & Tsoukas, 2009). Improvisation is seen as a necessary propensity for organizations to function because their pre-defined procedures will inherently fall short of addressing the arising novelties of an open-ended world (Tsoukas & Chia, 2002).

Following from the above it is evident that most studies adopt either a strong or weak view of disjunctive paradigm. Emphasis on separable entities and the regularities that govern their relationships oftentimes overshadows the uniqueness of improvised responses (Tsoukas, 2016). When compared to non-disjunctive studies, emphasis on abstracting social phenomena from their originating social contexts and dissecting them into separable components (even implicitly) raises questions about whether picturing the world in a disjunctive manner is adequate for accounting for the intricacies and singularities of practice (Sandberg & Tsoukas, 2011; Tsoukas, 2012).

According to Tsoukas (2016), organizations are constantly faced with singularities. This is because the world is open-ended. Even though organizations retrospectively create rules to deal with situations, they always find themselves amid new unique circumstances. Focusing on generalizable laws necessarily marginalizes the uniqueness of the circumstances agents face when improvising. Moreover, over the last years it has been increasingly argued that agents do not perceive their environment in terms of separable entities, but rather as a relational whole (Dreyfus, 2007b, 2017b; Sandberg & Dall'Alba,

2009; Sandberg & Tsoukas, 2011). In Shotter's (2017, p. 231) words, the disjunctive accounts emphasize "general rules, frameworks, plans and procedures... [but] such accounts overlook how experts make sense of the particularities of the unfolding situation".

To sum up, the contrast between the disjunctive paradigm's way of picturing and how improvisation is experienced in open-ended contexts, suggests that the former may not be the best prism to use in order to understand the process of improvisation. Over-relying on a disjunctive paradigm (especially the strong version) is problematic for the field of organizational improvisation because it marginalizes understandings of how agents develop new understandings to deal with situations on the spot. Put otherwise, picturing singularity in terms of regularity is a restricted view of the phenomenon, and over-reliance may lead to a limited view of how agents actually respond to situations.

2.5.2 The Outcome/Process Controversy

Adopting disjunctivist view or rejecting it, has implications about whether improvisation is understood in terms of an already completed outcome, or as an ongoing accomplishment. *In particular, I argue that adopting a strong disjunctive paradigm is related to understanding improvisation as an outcome, and inversely related to understanding improvisation as an ongoing accomplishment (and vice versa).* This is because the disjunctive paradigm favours conceptualizing the phenomena under investigation in terms of objects that have stable characteristics, while conjunctive studies tend to conceptualize in terms of processes.

Langley and Tsoukas (2017) discuss a typology through which the process or outcome orientation of studies can be identified. In particular, the authors theorize that the aforementioned orientation can be explained through the dichotomy of "strong process" and "weak process" views (see also Chia & Langley, 2004). In response to criticisms that the dichotomy is too restrictive (Sandberg, Loacker, & Alvesson, 2015, p. 321), I build on the former understanding and combine it with Harré's (1985) metaphysical categories

(Parmendidian, Heraclidean and Aristotelian) to develop a continuum of process views.

On the one end of the continuum, the Parmenidean process view is characterized by a metaphysical commitment to entities with unchanging essential natures (i.e., a strong disjunctive view). That is, change does not change the nature of things but only their manifestation. Borrowing an example from Harré (1985, p. 108), if a stone is gradually sculpted into a statue, this does not change the underlying nature of the stone (e.g., its chemical composition), only its appearance. Hence, the Parmenidian view analytically emphasizes a phenomenon's essential nature over its manifested qualities.

On the opposing side of the continuum, the Heraclidean process view is characterized by a metaphysical commitment to viewing phenomena in a constant state of *flux* (i.e., rejecting the disjunctive view). Change is understood as a transformation of quality. For instance, the way a stone is gradually transformed into a statue changes its existential status (viz., nature) - the stone can become something other than it initially was. Hence, the Heraclidean view places analytical emphasis on a phenomenon's quality over its nature. This does not suggest that this view denies the possibility of analysing an immaterial object such as a stone chemically, but chooses to highlight the existential aspect (if this can be said of inanimate objects), rather than the natural aspect of the phenomenon. However, it should be noted, because the statue analogy cannot illustrate this point, that beyond material objects, a Heraclidean process outlook views social phenomena in terms of fluctuating qualities because it does not accept a static underlying nature to such phenomena. Indeed, Heraclidean theorists would echo Sartre's (2007, p. 20) central tenet that, at least for social phenomena, "existence precedes essence", albeit in some cases with a more intense communitarian emphasis than Sartre. Of course, a Heraclidean process theorist would admit that nature (e.g., having a body) is a condition for social behaviour to be possible, but the former does not determine the latter (Castoriadis, 2005b; Matthews, 2006).

Conceptualizations that fall between outcome orientation and strong process understandings are referred to the Aristotelian process view (i.e., a weak disjunctive view). The latter explain entities in terms of processes, which nevertheless retain their substances (Langley & Tsoukas, 2017, p. 3). That is, sculpting a stone into a statue (viz., changing its quality) is understood as *fulfilling/actualizing* its potential (developing quality in terms of a set nature). In terms of social phenomena, this view recognizes the importance of quality, but subjects it to an underlying essential nature which pre-specifies its potential.

In the improvisation literature, most studies offer Parmenidean or Aristotelian process understandings, while Heraclidean process understandings are scarce. Studies adopting a strong disjunctive paradigm are also classified as having a Parmenidian process view (for example see Kyriakopoulos, 2011; Moorman & Miner, 1997, 1998b; Vera & Crossan, 2004, 2005; Vera et al., 2014). For example, Moorman and Miner conceptualize the essence of improvisation as static, but nevertheless understand that its manifestation changes depending on the levels of procedural or declarative memory. Studies that adopt a weak disjunctive view, but conceptualize outcomes being changed by other outcome-related processes or as time-limited processes, are classified as espousing the Aristotelian process view (Bechky & Okhuysen, 2011; Giustiniano et al., 2016; Patriotta & Gruber, 2015; Weick, 1993b). For example, Bechky and Okhuysen (2011) conceptualize that improvisation unfolds as a process that is “shaped” by a pre-specified organizational repertoire. While studies that reject the disjunctive view and discuss improvisation as a process in relation to other ever changing processes are understood as having a Heraclidean process orientation (e.g., Feldman, 2000; Tsoukas & Chia, 2002; Yanow & Tsoukas, 2009). For instance, Yanow and Tsoukas (2009) theorize that improvisation is an unfolding process that occurs in relation to dynamic changes in perception triggered by unfolding changes in situations.

To further justify my interpretation of why many process sensitive studies, manifest an Aristotelian process view, I would like to discuss two implicit assumptions. Sociomaterial structure is often portrayed as a fait

accompli (an already completed accomplishment) that sculpts its subscribers (e.g., Bechky and Okhuysen, 2011), and/or improvisation itself is confined to specific time-limited instances (e.g., Baker & Nelson, 2005). In contrast, a Heraclidean view is in agreement with what Castoriadis (2007, p. 76) was at pains to point out: *the sociomaterial structure is never fully determined - it is always in a fluid magmatic state, thus agents are called to continuously improvise.*

The reason for this is because structure does not exist a priori, but is a by-product of agent's behaviour (Harré, 2002, p. 116). For example, no external structure instituted the practice of tennis. The institutionalization (i.e., the formalization and wide adoption) of the sport was brought about by human agents. Nor were the rules of the sport imposed on people, rather the rules were chosen by people. However, even after rules are formalized, people do not follow rules (Harré, 2002) – “rules may be an aid to teaching” the practice (Wittgenstein, 1986, §54). This is because even though rules may exist for certain situations, situations *are not presented to agents with labels* specifying what type they are (Tsoukas, 2018a, p. 9) and neither do rules *contain their interpretation* (Taylor, 1993; Wittgenstein, 1986, §201). Put simply, agents constantly have to interpret how to behave depending on the circumstances – not on rules (Harré, 2002; Wittgenstein, 1986, §201).

This alludes to the affinity between agents and acrobats. Like acrobats who maintain their stability on the high wire by “continuously correcting” their imbalances, individuals accord with rules by continuously making adjustments to their behaviour in order to fit their behaviour with a rule (Tsoukas & Chia, 2002, p. 572). Hence, continuous adjustments continuously change (to a varying degree) the structure (and consequently the rules) ad infinitum. Thus as an entity, the only status a social structure can have is that of a “discursive category”, a way of talking about orderly behaviour on large scales (Harré, 2002, p. 121) and improvisation itself is a seamless feature of organizations given that ways of behaving are not set in stone (Tsoukas & Chia, 2002). Illustrating how the assumptions of Aristotelianism and Parmenidianism

contrast with Heraclidianism, may show that the former two oversimplify the complexity of improvisation.

Appropriate responses vary from context to context (Wittgenstein, 1986, §199) and “appropriateness” unpredictably changes over time (Castoriadis, 2005b). This leaves both the Parmenidian and Aristotelian prone to two criticisms. First, against the Parmenidian view, one can employ Tsoukas (2016, p. 145) argument that “first-time events are not exception but the rule in human life.” There is a temporal asymmetry between the creation of rules and dealing with situations. Thus, structures are far from being unchanging, because novel situations require new responses not contained in the structures, which nevertheless could be incorporated in the structure as a consequence (ibid., p. 152)”.

Secondly, against the Aristotelian view, one can use Charles Taylor’s (1995, p. 179) argument: even if rules exist for responding to a specific instance, “rules aren’t self-interpreting with a sense of what they’re about, and an affinity to their spirit, they remain dead letters or become a travesty in practice”. Choosing and according to a rule requires an agent’s judgement and know-how, so as to make the ‘appropriate’ identification and application for each specific situation (Dreyfus, 2007b, p. 248) Appropriateness, as was discussed above, is not set in stone - it fluctuates from situation to situation and from practice to practice (Wittgenstein, 1986, §19). In other words, each situation is unique and its meaning is context-dependent (Sandberg & Tsoukas, 2011, p. 341). Thus, there is always an element of uncertainty that a practitioner must overcome, because everything is subject to instability and judgement (Taylor, 1995, p. 177). Consequently studies that restrict improvisation to specific instances, overlook that it is an ever-present and inherent feature of all social settings.

In contrast, a Heraclidean views everything (including structure and improvisation) in a constant state of flux. By eschewing stability it is more able to capture the consequences of the lack of a fully predefined script (Shotter, 2011), and can in turn more fully illustrate how overcoming this uncertainty “inherently leads to improvisation” (Tsoukas, 2013, p. 61). It allows us to see

that improvisation occurs in an unstable world, which is further destabilized by the improvisation itself. Change is incremental (Chia, 2002; Tsoukas & Chia, 2002). Therefore, the Heraclidean viewpoint allows us “ways of grasping our continuously changing sense of living relatedness, both to each other and the larger world around us. Our modern, intellectualistic and individualistic [viz. disjunctive and Parmenidian] notions of understanding leave these relations-in-motion unnoticed in the background” (Shotter, 1996, p. 293).

2.5.3 The Functionalist Controversy

In a recent study, Visscher and colleagues (2018, p. 356) aptly highlight that the main assumption that underlies “the bricoleur” (or improviser) is that s/he is “a functional agent responding” to their environmental challenges. In other words, bricolage/improvisation is commonly pictured “as a rational response to environmental constraints” (ibid, p. 356). The latter being resource scarcity (Baker & Nelson, 2005; Halme et al., 2012) and surprise (Bechky & Okhuysen, 2011; Cunha, Clegg, & Kamoche, 2006). The mainstream way of picturing bricolage/improvisation omits important aspects of *lived experience* in organizations (Fisher & Barrett, 2019). Specifically, it marginalises that improvisation is rarely enacted sterile of moods and that the *raison d’être* of situational responses can be to uphold values or the standards of excellence of practices (see Holt & Cornelissen, 2014; Yanow & Tsoukas, 2009).

In a recent review of improvisation, the authors have pointed out the need to further examine how motivation and emotions influence improvisation (Cunha et al., 2017, p. 567; see also Fisher & Barrett, 2019). Although the latter is underexplored, some scholars have highlighted that moods play an integral part in making sense of how to respond to situations (Holt & Cornelissen, 2014; Weick, 1990), while others have highlighted that the underlying driving force of (re-)action is for the sake of values (Castoriadis, 2005b; Gehman, Trevino, & Garud, 2013; MacIntyre, 2007; Tsoukas, 2018b; Yanow & Tsoukas, 2009). In particular, Weick (1990) suggests that emotions can guide an agent’s perception to salient features of the situation. For example, stress is understood to function as a mechanism that narrows down an agent’s attention to the

stimulus that is threatening. This enables the agent to concentrate their cognitive resources to deal with the threat. Holt and Cornelissen (2014) highlight that moods can colour situations to appear under a specific light, which in turn motivate reactions. For example, by a situation appearing as dangerous, they can be motivated to flee (e.g., like the firefighters during the Mann Gulch disaster).

Both observations point to Castoriadis' (2005b, p. 14) insight, namely that facts (e.g., environmental conditions) and sense (viz., perception) are mutually constituted. Agents are embedded in a world of significations (viz., values/goods) and it is through the latter that the "subject necessarily grasps, to begin with, the whole of the historical material" (ibid., p.14). MacIntyre (2007) similarly suggests that human actions are driven by what is considered good, that is valued, by a community of practice (see also Tsoukas, 2018b; Yanow & Tsoukas, 2009). According to Gehman and colleagues (2013, pp. 103–104) values create unity around a concern and contribute to according to organizational norms. Thus, if the above is accepted it can be construed that to further understand improvisation requires a deeper understanding of both emotions and values.

2.6 Implications and Tacit Knowledge as the Way Forward

Taken together the discussion of the literature has revealed four limitations across the improvisation literature: (i) Metaphor as a device for understanding a phenomenon has its limitations. (ii) Separating social phenomena such as improvisation into distinct Parmenidian entities in order to identify quasi-causal relations between them, or into Aristotelian entities which have pre-specified ends, cannot adequately capture the singularity, open-endedness and pervasiveness of improvisation in lived experience. Thirdly, (iii) the circular assumptions of information processing cannot be a solid basis from which to understand agents' perception and improvisation. Finally, (iv) approaching improvisation/bricolage from a functionalist perspective oversimplifies the role of social values/goods and the emotional responses

situations evoke in agents. The above suggest that adopting a conjunctive (i.e., a holistic) view, a Heraclidean process orientation and a non-cognitive conceptualization of perception in combination with an examination of the role of values and emotions may offer a more suitable onto-epistemological platform to build a new theory of improvisation upon.

A move towards this direction has already been anticipated by a handful of studies (Tsoukas & Chia, 2002; Yanow & Tsoukas, 2009). These studies share an understanding of the world as being open-ended and value driven, and as such, inherently prone to singularities. The singularities are then constantly addressed through improvisation, which is also a non-predefined process. In addition, by drawing on phenomenology, they lay the foundations of a non-cognitive explanation of how agents are able to see and act upon opportunities for improvisation.

Yanow and Tsoukas' (2009) viewpoint is a suitable basis for building a new theory of improvisation for four reasons. First, in contrast to the metaphor perspective, which does not directly examine incidents of organizational improvisation, Yanow and Tsoukas' viewpoint allows researchers to analyse actual incidents of improvisation. Second, and in contrast to the cognitivist perspective where emphasis is put on an a-social individual and retrospective information processing, Yanow and Tsoukas' viewpoint allows one to grasp that improvisation is a social phenomenon that rests on peoples' non-cognitive awareness during action. Lastly, by suggesting that through tacit knowledge the social structure is a part of an individual, highlights the primacy of contextually-embedded agency. This overcomes the duality and pre-closure of sociomaterial practices, in which individual and sociomaterial structures are seen as two interacting entities.

However, important questions remain unanswered in this account. Although, it is highlighted that there are different levels of awareness, ranging from intuitive to reflective deliberation (see also Holt & Cornelissen, 2014; Sandberg & Tsoukas, 2015), it is not fully captured how the practitioners' perception affects improvisation (Yanow & Tsoukas, 2009, p. 1354). In other

words, when practitioners are involved in dealing with arising situations, how do they perceive what they ought to do? What do they notice? How does the context guide agents perception? How do emotions as opposed to moods influence what they notice (e.g. Holt & Cornelissen, 2014)? In either spontaneous reactions or reflective reactions, where is a practitioner's attention oriented to and how? How does this orientation allow them to improvise? Unlike previous studies on improvisation, what I am alluding to is grasping how tacit knowledge gives birth to "kind of knowing *sui generis*, an ethical know-how, to do with our way of being in the world, our stance in relating ourselves to our surroundings" (Shotter, 1996, p. 309).

Knowing what to do in action has been referred to as 'immanent sensemaking' (Sandberg & Tsoukas, 2015), or more simply, perception (Merleau-Ponty, 2012), which is highly dependent on tacit knowledge (or know-how) (Hadjimichael & Tsoukas, 2019). As highlighted by Sandberg and Tsoukas (2015), this phenomenon has been largely undertheorized and underexplored (see also Willems, 2018). This is largely because sensemaking has focused more on retrospective accounts of actions (Holt & Cornelissen, 2014, p. 536). As a result, "we lack a description of the structure of situated action" (Suchman, 2007, p. 122), which calls for the development of a vocabulary that can do so (Sandberg & Tsoukas, 2015; Shotter, 2017). Focusing on retrospective accounts, in combination with the scarcity of empirical studies on improvisation (Hadida et al., 2015), has led to recognition that little is known about how organisational members develop responses to surprises 'in the midst' of unfolding events (see Cunha et al., 2006, p. 326). By building on Yanow and Tsoukas' insights, as well as considering the concerns about retrospectiveness the next chapter will seek begin to lay the foundations for answering the above questions by developing a vocabulary to talk about improvisation and perception during "real time experience" (or lived experience) (Miner et al., 2001, p. 316) and further refined research questions. The foundation of this attempt will be the concept of tacit knowledge.

2.7 Summary

This chapter has permitted the opportunity to see that the different perspectives on improvisation illuminate certain aspects of the phenomenon under discussion. By doing so, each in its own way has enhanced our understanding of improvisation. The metaphor perspective has focused on highlighting the similarities between diverse fields such as those of music, theatre and psychology with organizational improvisation. The cognitivist perspective has insisted on the fact that the way individuals process situations affects how they improvise. Key moderators that affect information processing and improvisation have been identified to be memory and expectations. Finally, the sociomaterial perspective has specified that individuals enacting improvisation, do so in relation to social and/or material structures.

All the above perspectives have been discussed and critiqued based on their theoretical and methodological premises. This in turn has assisted in explicating their major contributions and limitations. Each of the above perspectives faces its own limitations and none can adequately account for organizational improvisation by itself. By focusing on the similarities of improvisation between the arts and other areas with organizations, the metaphor perspective does not focus on actual instances of organizational improvisation. As a result, the nuances of improvising within organizational settings are not captured. By adopting a dual processing perspective of cognition to explain how people can improvise, the cognitivist perspective is liable to several theoretical limitations. First, it relies on circular assumptions to explain how perception in the present is related to previous experiences. Second it maintains that responding to a situation entails responding to internal representations rather than the exigencies of the situation itself. The latter theoretical premise contrasts the findings of several empirical studies which highlight that the ability to perceive nuances particular to each situation is key to improvising. Lastly, the sociomaterial perspective does not account for how the individual is able to assimilate practice in order to enact improvisation. Improvisation is argued to occur in very specific instances and in many cases it is argued to occur

in relation to sociomaterial structures (cf., Tsoukas & Chia, 2002). However, it has been argued that improvisation is more pervasive than originally argued and that structures cannot prescribe responses. Although, Yanow and Tsoukas (2009) lay the foundations for a new, non-cognitive explanation of improvisation, there is still no consistent theoretical account of how a person can draw on their past experience and their actual surroundings to perceive an appropriate action. Specifically, the following rather broad question has remained unanswered: how does an agent perceive how to “go on” to improvise?

Given the lack of answers to the above question, it is still relatively unclear how organisational members enact improvisation in relation to their lived experience. For the purposes of my project I will rely on a conception of perception and tacit knowledge deriving from strands of ecological psychology, phenomenology and practice theory (Gibson, 2015a; Ingold, 2002; Koffka, 1936; Merleau-Ponty, 2012; Rietveld, 2012a). In the first two traditions, it is assumed that perception and knowledge: (i) do not require the association of distinct representations, but the perception of situations and objects as coherent wholes (Koffka, 1936); (ii) the person is as much a part of the structure, as the structure is a part of the person. The meaning of anything perceived is affected by its place in the nexus of both the sociomaterial context (see Dreyfus, 1991; Dreyfus & Taylor, 2015; Matthews, 2006). These theoretical traditions and their potential relevance to organizational improvisation will be discussed in detail in the next chapter.

CHAPTER 3: INSIDE PERCEPTION AND IMPROVISATION

“Intuitive understanding...rests in perceptual skills that emerge, for each and every being, through a process of development in a historically specific environment. (Ingold, 2002, p. 25)”

"Ability affects perception: people see those things they can do something about" (Weick, 1993a)

3.1 Introduction

The purpose of this chapter is to develop a preliminary understanding of how improvisational action unfolds in relation to the lived experience of agents in ever-unfolding sociomaterial practices and unique circumstances. This is important because over the last years there have been calls to take into consideration the relation of situated action to local circumstances (Shotter & Tsoukas, 2011; Tsoukas & Dooley, 2011). To overcome the shortcomings of current terminology in talking about unfolding action, I seek to synthesize terminology from phenomenology, ecological psychology and practice theory.

The synthesis allows my thesis to address the identified theoretical limitations of the previous approaches to studying improvisation by having three advantages. (i) Unlike the metaphor and cognitivist perspectives, the terminology of the phenomenological and practice fields is especially formulated for capturing the unfolding experience and the local sociomaterial embeddedness of agents (Shotter, 2008, 2017). (ii) Unlike cognitivist scholars, theorists espousing phenomenology have developed a theory of mind which is not reliant on association or knowledge stored in memory (Dreyfus, 2017a; Polanyi, 1958; Ribeiro, 2014; Rietveld, 2012b). On the contrary, accounts of the workings of the mind are seen to be interdependent with local circumstances and established social practices (Tsoukas, 2011a, pp. 455–456). (iii) Lastly, unlike some manifestations of the sociomaterial and cognitivist perspectives,

the combination of phenomenology and practice theory overcomes the duality between individual and structures and functionalism (Reed, 2005). This is because the phenomenological-cum-practice perspective assumes that agents are entwined with their environment by it being both a part of themselves and they themselves being its creators. That does not mean that the environment does not exist outside of people, but that it is socially interpreted and utilised (Dreyfus & Taylor, 2015; Holt & Mueller, 2011). As a result, agents are social beings who themselves are responsible for sustaining or abstaining from habits of behaviour depending on how they interpret the affordances of their environment (Rietveld, 2013). Such patterns of behaviour are seen as the manifestation of the structure itself.

The chapter is organized as follows. First, I explore how the notion of tacit knowledge is conceptualised by improvisation scholars across all three perspectives. This is important for two reasons: (i) tacit knowledge in the previous chapter was identified as a way of overcoming disjunctive and functionalist dilemmas (e.g., structure/agent) (Yanow & Tsoukas, 2009), and (ii) many scholars have considered tacit knowledge important for improvisation (Batista et al., 2016). I then focus on the phenomenology of tacit knowledge – i.e. how tacit knowledge is experienced. After explaining how tacit knowledge is experienced, I highlight how tacit knowledge is acquired in relation to participating in a sociomaterial context. This signifies how structure and agents are mutually constituted. After highlighting, the entwined nature of tacit knowledge to the sociomaterial context, I seek to create the basis of describing how situations are perceived and experienced by agents in terms of affordances. That is, how agents differentiate between aspects of their surroundings amid changing circumstances in order to improvise. This suggests that the agent and their environment are also mutually constituted. Then, I seek to clearly delineate the initial implications of utilising the synthesis to further understanding improvisation.

3.2 Approaches to Tacit Knowledge in Relation to Improvisation

As discussed in the previous chapter, Yanow and Tsoukas (2009) introduce a phenomenological-cum-practice perspective. The theoretical underpinnings of this perspective allow the discussion of improvisation to overcome limitations of the other identified perspectives. A major component of this perspective is skilfulness (or, expertise/mastery). Skilfulness suggests that agents can improvise in relation to unfolding events insofar as agents draw upon tacit knowledge (or know how). For example, without expertise in fires, the firefighter in the Mann Gulch disaster would not have been able to improvise by creating an escape fire (Weick, 1993b).

As consistently highlighted throughout the literature, skilfulness relies on individuals cultivating tacit knowledge (Dreyfus, 2014; Dreyfus & Dreyfus, 2005; Ribeiro, 2014, 2017; Ribeiro & Collins, 2007; Sandberg & Pinnington, 2009; Sandberg & Tsoukas, 2011; Tsoukas, 2011a). Tacit knowledge is commonly defined as knowledge agents draw upon in use, but cannot express in language, nor have consciousness of (Hadjimichael & Tsoukas, 2019). It allows practitioners to intuitively respond to situations in the event of both routine and non-routine occurrences (Ribeiro, 2014; Shotton, 2008, p. 513; Tsoukas & Vladimirou, 2001). The process through which skilfulness allows agents to improvise will be gradually assembled throughout the chapter.

Researchers have established that the ability to consider contextual factors is key to improvising successfully (Bechky & Okhuysen, 2011; Kamoche & Cunha, 2001; Vera et al., 2014). This is because “practice inevitably exceeds the enframing of its own procedures of order production...[which in turn] is a practical problem for everyday life, solved pragmatically...in ways good enough for [the agent’s] purposes at hand” (Suchman, 2007, p. 193; Tsoukas, 1998b). Tacit knowledge, irrespective of the perspective held on improvisation, is considered to be fundamental for improvisation (Cunha et al., 2009, p. 187). From a metaphor perspective, “tacit understandings” are seen to develop “through experience” (Bathurst & Williams, 2013, p. 42). For example, the more a musician performs across a

variety of audiences, the more able they are to draw on their experience to improvise. From a cognitivist view, “procedural knowledge...often represents tacit knowledge” (Moorman & Miner, 1998b, p. 708). For instance, a teacher can improvise in a more time efficient manner when dealing with a student that forcers them away from their lesson plan (ibid., p. 709). Similarly, from a sociomaterial perspective, Bechky and Okhuysen (2011, p. 258) have showed that SWAT officers and film crews draw on collectively taken for granted knowledge of the “structural context” to improvise. Nevertheless, most researchers use tacit knowledge as a peripheral construct in relation to improvisation (Batista et al., 2016, p. 420; Brady, 2011; Crossan et al., 2005; Cunha et al., 2009, 1999; Kamoche & Cunha, 2008; Kamoche et al., 2003; Vera & Crossan, 2005; Vera et al., 2014, p. 22) and very few have focused upon it (Kyriakopoulos, 2011; Moorman & Miner, 1998a, 1998b; Yanow & Tsoukas, 2009).

Approaches to tacit knowledge within the management literature are diverse and in some cases, have conflicting assumptions (for an extensive review see Hadjimichael & Tsoukas, 2019). For example, while some scholars maintain that tacit knowledge can be best described as knowledge that has not yet been abstracted from practice (Feller, Parhankangas, Smeds, & Jaatinen, 2013, p. 316; Nonaka & Takeuchi, 1995; Nonaka, von Krogh, & Voelpel, 2006), other scholars maintain that tacit knowledge cannot be abstracted because it is an inescapable feature of all knowledge (Gueldenberg & Helting, 2007; Miller, 2008; Oborn & Dawson, 2010; Tsoukas, 2011a). Similarly, while some scholars maintain that tacit knowledge is a feature of individuals (Athanassiou & Douglas, 1999; McCloy, Campbell, & Cudeck, 1994; Sternberg, 1997), others argue that tacit knowledge is a feature of groups (J. S. Brown & Duguid, 2001; Collins, 2010; Cook & Brown, 1999). The controversy about the nature of tacit knowledge has affected how the construct is theorised in relation to improvisation. Largely two perspectives on tacit knowledge have infiltrated improvisation research: the (i) entitative and (ii) process. A discussion of both follows.

The Entitative perspective was popularized by Nonaka and Takeuchi (1995) and has proven influential as it was the foundation for the emergence of the knowledge-based perspective on organizations (Easterby-Smith & Lyles, 2011; Grant, 2013; Spender & Grant, 1996). It manifests two basic assumptions: (i) it maintains that knowledge, can be dichotomised into two separate entities: tacit and explicit knowledge (see Nonaka, 1994; Nonaka & von Krogh, 2009; Nonaka et al., 2006); (ii) both types of knowledge are further refined to include the level of analysis – individual or collective (see Collins, 2010; Cook & Brown, 1999; Kogut & Zander, 1992; Lam, 2000; Tywoniak, 2007). Tacit knowledge at the collective level is seen as being embedded in social structures such as norms, whereas at the individual level it is seen to be part of the cognitive schemas of practitioners (Gerpott, Lehmann-Willenbrock, & Voelpel, 2017; Hecker, 2012). Depending on the level of analysis adopted, these two (i.e., tacit and explicit) or four types of knowledge (i.e., individual tacit, collective tacit, individual explicit and collective explicit) are seen to interact with each other to produce responses to situations (Collins, 2013; Cook & Brown, 1999; see also Moorman & Miner, 1998b). For example, to cycle one needs individual tacit knowledge in the form of embodied knowledge and at the same time collective tacit knowledge in the form of knowing the norms of navigating traffic in a given context (Collins, 2006). This view of tacit knowledge has influenced studies across improvisation perspectives discussed (see Baker, Miner, & Eesley, 2003; Bingham & Eisenhardt, 2011; Brady, 2011; Crossan et al., 2005; Cunha et al., 1999; Moorman & Miner, 1998a, 1998b; Pavlovich, 2003; Vera & Crossan, 2005).

Like Nonaka's theory of knowledge, the majority of improvisation scholars referring to knowledge, take for granted that knowledge is Janus-faced. That is, they distinguish knowledge in tacit knowledge (also referred to as procedural or skill memory) or explicit knowledge (also referred to as declarative or fact memory) (Moorman & Miner, 1998b, p. 708). Especially in the Cognitivist perspective, as discussed earlier, tacit knowledge is equated to procedural memory and that it produces differential responses to situations in

allegiance with declarative memory (which is equated to explicit knowledge) (Crossan et al., 2005, p. 138; Cunha & Cunha, 2003; Cunha et al., 1999, p. 321; Kamoche et al., 2003, p. 2045; Moorman & Miner, 1998b, p. 708; Vera et al., 2014, p. 17). The distinction of knowledge into tacit and explicit types, however, is not restricted to the Cognitivist perspective. For example, in the Metaphor perspective it is argued that jazz musicians internalize “theory and rules” (viz. explicit knowledge) of “musical progressions” (Barrett, 1998, p. 606). Once internalized, “these rules become tacit” and in turn allow musicians to improvise (ibid., p. 606). In the Sociomaterial perspective, for example, Brady (2011, p. 41) argues, that General Chuikov’s ability to improvise successfully rested on his ability to convert tacit knowledge into explicit.

However, the Entitative perspective has four critical issues that could prove detrimental to the study of organizational improvisation: (i) knowledge as memory thesis, (ii) disjunctive thesis and (iii) outcome orientation and describing improvisation in post-hoc language.

First, as argued in section 2.3.3, knowledge and memory are not one and the same thing. On the contrary, if we accept this thesis then we would necessarily concede that agents are more responsive to information stored in their brains, rather than to actual situations (cf. Chia, 2002, p. 866). This would be contrary to a series of studies on expertise that highlight, that to be skilled is to be particularly sensitive to minor differences in situations (Benner et al., 1999; Dreyfus & Dreyfus, 2005; Freeman, 1999; Ribeiro, 2014; Rietveld & Brouwers, 2017).

Second and as argued in section 2.3.3, this perspective like the organizational memory approach, advocates that tacit knowledge is separable to explicit knowledge. However, this is a false epistemological dichotomy (Tsoukas, 2005, pp. 384–386). Both tacit and explicit knowledge are mutually constituted. For example, one cannot cycle by only being aware of certain *facts* such as the equation describing balancing on bicycles - one needs to practice cycling to *know how* to do so (Tsoukas, 2011a). Similarly, to understand the equation describing balancing on a bicycle one must already know how to make

sense of mathematical equations. The interpretation of ‘facts’ necessarily relies on a socially embedded agent who has developed the ability to judge the relevance of facts to each situation; the latter necessarily relies on tacit knowledge (Ribeiro & Collins, 2007). As argued by Polanyi (1966a, p. 7): “While tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood and applied. Hence all knowledge is either tacit or rooted in tacit knowledge. A wholly explicit knowledge is unthinkable.” The above suggest that tacit knowledge is the ontological basis of any explicit knowledge, and hence it would be erroneous to consider tacit and explicit knowledge in terms of equivalence.

Moreover, by viewing ~~knowledge as a separable entity~~, this suggests an acceptance of the objectivist premise (Chia, 2002; Shotter, 2008; Tsoukas, 1997). That is, that knowledge, people, and social norms are primarily distinct entities which interact thanks to quasi-causal relationships. But as argued in section 2.5.1, if one concedes this thesis, it is tantamount to admitting that people, social norms and knowledge are not embedded in discursive practices (Taylor, 1995, Chapter 4). In turn this raises the question of how people endow what they see with meaning given that they are lone information-processors? A theoretical dilemma may lead to two problematic possibilities: (i) solipsism (doubting whether reality exists outside the self) (Nagel, 1987, p. 11) and (ii) anarchic relativism (“knowledge is whatever we imagine”) (Spender, 2008, p. 170). Both features have been shown to be impossibilities (Wittgenstein, 1986, §243-271)

Finally, by offering explanations of tacit knowledge that rely on quasi-causal relationships, what is highlighted are general rules posited after the event of action (Shotter, 2005b). Such accounts as argued throughout the previous chapter overlook how action takes place in the midst of unfolding circumstances (Sandberg & Dall’Alba, 2009; Sandberg & Tsoukas, 2011). As Shotter (2017, p. 232) has posited “at each step within a human situation, the situation, so to speak, ‘talks back’ to us, for as we take each step, not only are new possibilities opened up, while previously unexplored ones are shut down, but the new

circumstance stands before us like a question, requiring us to act into it with our answering response”. By not capturing how ‘new possibilities open up’, how others are ‘shut down’ and how practitioners answer circumstances in the moment – “we lack a description of the structure of situated action” (Holt & Cornelissen, 2014, p. 536; Suchman, 2007, p. 122).

The Process perspective on tacit knowledge is less widespread and theoretically underexplored in improvisation; however, it appears to have the tools to address how people respond to the singularities of situations as it does not attempt to offer post-hoc analyses of situations. Except for Batista and colleagues (2016, p. 419) and Yanow and Tsoukas (2009, pp. 1349–1350), it has hardly been utilised to specifically study improvisation.

A Process view of tacit knowledge suggests that it is not a form of memory, but a form of subsidiary perception. Namely, the non-focal awareness of a partially (sometimes) articulable understanding that informs actions. An example of this is Ribeiro’s (2014, p. 566) account of how workers at a nickel mine have the ability to perceive the moment at which the furnaces of the plant have an over proportionate amount of slag inside. Such situations pose risks to the equipment and the workers themselves. Experienced operators can identify such situations by perceiving nuances in the “yellowness” of the sparks emitted by the furnace. Inexperienced operators and visitors do not have this ability. Moreover, the experienced operators themselves cannot explain exactly how they are able to do so. They gain this ability by spending weeks looking at the jet.

In contrast to the Entitative perspective, the Process perspective’s core assumptions maintain that tacit knowledge: (i) is not an entity, but a perceptual process that underlies all interactions within agents’ environments and (ii) is the basis for explicit knowledge (Gueldenberg & Helting, 2007; Miller, 2008; Polanyi, 1961; Tsoukas, 2011a). In other words, this perspective maintains that tacit knowledge is not a set of internalized facts that are selectively drawn upon. As will be further elaborated below, the process perspective illustrates that tacit knowledge is tantamount to perceiving nuances. The latter occurs through

socialization in practice. These assumptions overcome both the critical issues identified above as part of the Entitative perspective and the dichotomy of structure and agent as discussed in the previous chapter (section 2.5.1).

The controversies and limitations identified in both Chapter 2 and this section, in combination with the promise and underutilisation of the process perspective for understanding improvisation through tacit knowledge, signify that there is a need for further theoretical development that can overcome the limitations identified. To do so, the next section seeks to build on the insights from Yanow and Tsoukas (2009) and the Process perspective on tacit knowledge.

3.3 Tacit Knowledge as Indwelling: The Basis of Significance and Action

Following from the above, tacit knowledge, in the organizational improvisation literature, has largely been portrayed as an entity instead of a process unfolding in real time (more about this later). Tacit knowledge is fundamental to understanding improvisation because responding to situations entails the utilisation of know how (Hadjimichael & Tsoukas, 2019). In order to operationalise tacit knowledge for my study I will first seek to synthesize accounts of the construct that do not see it as a static body of knowledge, but as an ever-unfolding perceptual process (Polanyi, 1965; see also Tsoukas, 2011a). I hope to unpack the black box of how people are able to perceive and respond to their surroundings in the midst of action by employing an approach that is sensitive to “the particular, the local, and the timely and alerts us to the incessant creation of novelty by sentient, embodied, situated, reflexive, and responsive beings; and emphasizes both the open-endedness of processes and human praxis to shape them” (Shotter & Tsoukas, 2011, p. 335). This will allow me to begin to refine the research question of the study (i.e., how do agents enact improvisation) by beginning to craft a vocabulary that can encapsulate the situated nature of improvisation (Shotter, 2017).

In developing the concept of tacit knowledge, Michael Polanyi¹ outlines that it can be understood to be comprised of four interdependent dimensions; (i) the functional, (ii) the phenomenal, (iii) the semantic and (iv) the ontological (Greene, 1969, pp. xiv–xv; Polanyi, 1966b, Chapter 1). However, it should be stressed that all dimensions are not rooted in an isolated subject, but in an embodied subject who in turn is embedded in sociomaterial practices (Polanyi, 1958, p. 209). A discussion of each dimension follows.

The functional dimension refers to the notion that a person can pay attention to something, but can only do so by relying on other indications that one is unaware of (Polanyi, 1965). According to Polanyi (1966b, Chapter 1), this can be explained by conceiving that one has two different types of awareness. Both of these form the functional dimension, and are called the subsidiary and the focal. Focal awareness refers to what one is focusing on while perceiving. Subsidiary awareness refers to what is in the fringe of their focal awareness.

One is not aware of subliminal awareness because it is formed by relying on two types of stimuli; the subliminal and marginal (Polanyi & Prosch, 1977, pp. 38–39). Subliminal stimuli are indications which cannot be sensed directly (Polanyi, 1966a). For example, in order to see something in the dark, one can only do so by relying on the shift of the size of one's pupils depending on the lighting conditions. Marginal stimuli are also indications which one relies on in order to focus on something else, but one could revert their attention to them if they chose so (Polanyi, 1965). For instance, consider peripheral vision, when one is observing something it is always part of a background we do not pay attention to - like looking at a painting on a wall, one focuses on the painting but not on the background which is the wall. If one wanted to, they could shift their attention to the background (i.e. the wall) but that would also be a part of another background (i.e. the section of the room).

¹ Polanyi affirmed that he was furthering Merleau-Ponty's (2012) account of perception and knowledge (Polanyi, 1965, pp. 807–808, 1969, p. 222) as being embedded in both the body and the sociohistorical context (Greene, 1969 p. xi; Nye, 2013, p. xv, 262; Polanyi, 1958, p.212).

Both subsidiary and focal awareness, apart from enabling a subject's perception of a visual field, also necessarily enable and underlie social phenomena such as reading, communicating or learning (Polanyi, 1966b, p. 5; Polanyi & Prosch, 1977, p. 35). Take for example reading. When one reads a sentence, one depends on both subliminal stimuli (e.g., motion of pupils) and marginal stimuli (e.g., grammatical structure) to be focally aware of the sentence's meaning. However, one could shift their focus to the grammatical structure (marginal stimulus and new focal object), but that would imply that one is no longer attending to the meaning (original focal object) of the sentence. Following the above, it appears that in order to perceive something, we attend from our subsidiary awareness to the object of our focal awareness. It should be stressed that subsidiary awareness is by no means an unconscious process. Instead it should be conceived as not being in the epicentre of our attention (Polanyi, 1969, p. 194; Polanyi & Prosch, 1977, p. 39).

However, one does not experience these two types of awareness as separate but as a cohesive whole. The integration of the aforementioned awareness is referred to as the phenomenal dimension of tacit knowledge (Polanyi, 1966b, p. 11). Following the example of reading, for one to be able to read one should have already personally put effort into understanding language and interpreting its symbols (see Polanyi, 1958, Chapter 7, 1961). Therefore, while reading, one's perception tacitly integrates their bodily functions (e.g., eye movements), their understanding of the language and its symbols in order to be able to focus on the meaning of what is being read. So, when one masters reading, one does not focus on the symbols or the sounds they make when articulated. On the contrary, one attends from the markings to what is being expressed. As such, in Tsoukas' (2011a, p. 461) words, the phenomenal dimension is the "transformation of subsidiary experience" which gives rise to a new phenomenally united "sensory experience".

As the processes of both the functional and phenomenal dimensions seem to occur simultaneously, a person is only aware of the meaning of this integration. This gives rise to the semantic dimension (Polanyi, 1966b, p. 13).

To perceive an entity as coherent entails grasping "the meaning of its features" (ibid.). In other words, instead of looking at "sense data, that is, patches of light and colour", one can see the phenomenological meaning of the sense data (Polanyi, 1962a, p. 619). The markings on a paper do not have meaning in themselves. "The capacity to see objects is acquired by training...The particulars of perception...have the distinctive peculiarity of being projected from the interior of the body into the space outside it" (Polanyi, 1961, p. 461).

Ribeiro (2014, p. 560) illustrates this point beautifully with an example of how the light of candle changes its appearance for a child (see also Merleau-Ponty, 2012, p. 52). Prior to experiencing the light of a candle, the child is attracted to it. In fact, the child may even reach for it. Upon reaching, the child feels the burn and as a result the light of the candle becomes repulsive. As a result, the 'practical significance' of the light for the child only manifests itself after exploration (Ribeiro, 2014, p. 560). The light is no longer a patch of light and colour, devoid of significance - with experience the light of a candle has a meaning. As such, the child learns to attend from the light of the candle to one of its meanings - heating or burning. Hence, one is focally aware of what one is perceiving through the semantic integration of the subsidiary elements that underlie one's focus (Polanyi & Prosch, 1977, p. 35). This is a feature of all skilful action.

Therefore, in any skilful act a person relies on tacitly integrating subsidiary elements (including past experience) in order to attend from them, to their joint meaning (Polanyi, 1961, p. 463). To see something as meaningful requires seeing something against a background of meaningful particulars (ibid.). For example, consider a blind person that uses a stick to detect obstacles in his/her path (Dreyfus, 1991, p. 65). Over time s/he learned to be aware of the feelings the tool (subsidiary element) evokes on their hands, in terms of its use - whether the path is clear (focal element). If s/he reflected on the stick, s/he would not be able to apprehend its meaning. This signifies that when the person thinks about the stick, s/he is alienated from the meaning the stick offers for walking. This is because s/he changes the background against which s/he is

perceiving. That is, s/he is focusing on the subsidiary aspects previously taken for granted, such as the stick's qualities (i.e., heavy, smooth) (Polanyi, 1969, pp. 147–148). Thus, reflecting on a tool or on an action, leads to a breakdown (see Yanow & Tsoukas, 2009), which stops fluent performance of a skill.

Hence, tacit knowledge is grounded in non-reflectiveness but is the basis of intelligibility even when one is reflective. This illustrates the final dimension of tacit knowledge, the ontological. The ontological dimension denotes that tacit knowledge “is a knowledge of” - it is not an independent entity that exists in a void (Polanyi, 1966b, p. 13). Polanyi (1961, 1962a, 1965) explains what he means by this by referring to “*indwelling*”². The latter refers to the integration of the subsidiary and focal components which allows the perception of meaning. However, in his words, indwelling occurs when “we pour ourselves into [objects, conceptual or artefactual] and assimilate them as part of ourselves” in order to attend to the meaning they evoke³ (Polanyi, 1966b, p. 15, 1969, p. 147; Polanyi & Prosch, 1977, p. 36). Therefore, indwelling relies on one's personal experience within a social milieu (Polanyi, 1961, 1966b, p. 17). By dwelling in one's experience, objects such as the lights of candles, scribbles on pages are spontaneously presented as meaningful. This illustrates that, in order to participate in any understanding, one must first dwell in one's body in order to attend to meaning. This signifies that embodiment is primary and inseparable to acquiring any knowledge and perceiving any meaning (Polanyi, 1966b, p. 15, 1969, p. 147; Polanyi & Prosch, 1977, p. 36; Todes, 2001, p. 88).

Understanding tacit knowledge in terms of indwelling allows one to begin to talk about improvisation in strong process terms (Langley & Tsoukas, 2017), disentangle knowledge from memory and to place a stronger emphasis on agents' lived experience of improvising (see Fisher & Barrett, 2019). This is

² This term is referred to as ‘synchronization’ by Ribeiro (2014, 2017) by drawing on Merleau-Ponty (2012) and a ‘way of being’ by Sandberg and Pinington (2009) by drawing on Heidegger (2013).

³ This term is similar to Heidegger's (2013, pp. 97–98) term of equipment (see also Dreyfus, 1991, p. 62; Lamprou, 2017; Riemer & Johnston, 2014; Sandberg & Dall'Alba, 2009).

because tacit knowledge (Ribeiro, 2014) and improvisation (Miner et al., 2001, p. 316) are understood to be contingent on real time perceptual experience. For example, going back to the example of the improvisation of jazz musicians – they rely on the functional dimension of tacit knowledge. Specifically, they rely on both subsidiary and focal awareness. Subsidiary awareness comprises of musical distinctions, embodied senses (e.g., listening, seeing, feeling). Focal awareness focuses on playing their musical instrument, the actions of the other band members and the responses of the audiences. Both types of awareness are not experienced and made sense of separately. On the contrary, they are presented in terms of both the phenomenal and semantic dimensions of tacit knowledge. That is, jazz musicians are simultaneously aware of all the subsidiary particulars in terms of the meaning evoked as part of their focal awareness (i.e., how their band members are playing and what the audience demands). Finally, attending from all the latter gives rise to the ontological dimension. Dwelling in the meaning evoked by the subsidiary particulars, allows the musicians to be responsive to the situation, which in turn allows them to improvise in a manner that is aligned with contextual nuances (such as the crowd, tune and roles in band).

3.4 The Pre-Requisites for Indwelling: Educating Perception through Experience

Above, I have discussed the four entwined dimensions of the ability to indwell and as such perceive significance. Because the perceptual field does not have inherent meaning without experience (Polanyi, 1962a, p. 619; Ribeiro, 2014, p. 561), there are two underlying requirements for indwelling: (i) participating in a Practice (aka ‘form of life’) and (ii) becoming experienced in participating in a Practice (Nicolini, 2011; Tsoukas, 2018b; see also Wittgenstein, 1986, §19). In Polanyi’s (1958, p. 209) words one “cannot speak of a scientific fact, of a word, of a poem or a boxing champion; or last week’s murder or the Queen of England; of money or music or the fashion in hats, of what is just or unjust, trivial, amusing, boring or scandalous, without implying

a reference to a consensus by which these matters are acknowledged – or denied”. Hence, Polanyi (1958, p. 216) holds that participating in a community is what endows actions and the whole environment in general with meaning (see also Castoriadis, 2007; MacIntyre, 2007; Merleau-Ponty, 1964, pp. 24–26; Taylor, 1995, Chapter 4; Wittgenstein, 1986). One must attend *from* a pre-understanding of their ‘sociomaterial world’ *to* perceive the focal - otherwise everything would be unintelligible (Castoriadis, 2007; Dreyfus, 2017a, Chapters 1 & 2; MacIntyre, 2007; Schatzki, 2005; Taylor, 1995, Chapter 4). As improvisation is tied to attending from the nuances of situations, understanding the two requirements of indwelling can help shed light on improvisation. Both requirements for indwelling are discussed in turn.

3.4.1 Participation in Practice

What is a Practice and how does experiencing it yield such a mystical power to endow meaning to what people perceive? Phenomenologically informed research allows us to answer this question clearly without relying on the duality of structure - agent (Freeman, 1999; Kiverstein & Wheeler, 2012; Radman, 2012; Stewart, Gapenne, & Di Paolo, 2010; Varela et al., 1991). Both point to the fact that by participating in a community, people *learn* to intuitively share similar (i) conceptual/normative distinctions, (ii) valences (what is considered valuable) and (iii) emotions. Each will be elaborated in turn below.

Conceptual/Normative Distinctions. Haugeland (2013, p. 3), a Heideggerian philosopher, maintains that people are a “community-participating animal”. Communities are characterised by conformism, or as Heidegger (2000, p. 197) bluntly states, adherence to the “dictatorship of the public realm”. Conformism does not only consist of people imitating each other, but also of censoring both themselves and others. That is, the tendency people possess to approve of similar behaviour and at the same time, suppress and disapprove of variation. Over time due to this peer pressure, variation is suppressed and as a result the behavioural dispositions of the members of the community become ever more similar. This aggregation of the behavioural

dispositions due to conformism, forms norms (Dreyfus, 2017a, p. 23; Haugeland, 2013, p. 4).

Norms are dispositions passed on from person to person, generation to generation that dictate what is behaviourally feasible or acceptable. Behaviour deviating from norms, is not only considered peculiar but unacceptable – it comes with a stigma as it is something you are “not supposed to do”. However, as Haugeland emphasises “it is crucial that what gets normalized are not, strictly speaking, actual instances of behaviour but rather dispositions to behave, *contingent on the circumstances*” (Haugeland, p.5, emphasis added). Understanding norms becomes *our* understanding (Dreyfus, 2017a) – it becomes “shackled to us” by seeing the world in the ‘common sensical’ way (Holt & Cornelissen, 2014, p. 537), or developing a “sixth sense” (Arendt, 1978, p. 50). For example, the Mann Gulch firefighters took it for granted that their job was to put out what they thought to be the 10 o’clock fire. In fact, it was so taken for granted that when there were signs that the fire of a different type, they did not know how to respond (Holt & Cornelissen, 2014; Weick, 1993b)

To discriminate between circumstances and types of behaviours, agents need a set of categories to arrange these into sorts and use these categories consistently with each other (Gabriel, 2003; Haugeland, 2013, p. 6). “Even while our thoughts are of things and not of language, we are aware of language in all thinking (so far as our thinking surpasses that of the animals) and can neither have these thoughts without language, nor understand language without understanding the things to which we attend in such thoughts” (Polanyi, 1958, p. 101). Consider Wittgenstein’s (1986, §293) beetle in the box thought experiment⁴. A group of people have a box in which they have a ‘beetle’. But no one can see inside another person’s box. Despite the latter, this does not hinder people from talking about ‘beetle’ in a meaningful way. This is because the shared public meaning of beetle is tempered by how people use the term

⁴ Also referred to as the “Private Language Argument”

(see also Wittgenstein, 1986, §19). Although, others cannot see my beetle – to communicate about it I do not have any other choice than to use words that we can all understand.

As it has been mentioned above, the understanding of something is based on how the thing is referred to. If I created my own language, no one would be able to understand what I am trying to say. Thus, beetle or any other verbal meaning is restricted to the public meaning of our language – that is how we learn from each other to talk about things (Taylor, 1995; Wittgenstein, 1986). As Edwards (1997, p. 242) outlines, shared “conceptual categories are pervasive in discourse” and are the basis of anything we can say (e.g., child – mother). Using these categories allows people to simultaneously explain, narrate, manage accountability and orient awareness. That is, they are used to establish the existence of named objects and various significations in behaviour and the physical word. Without the invention of *categorising things into sorts*, people would not be able to establish the existence of the significances distinguished in virtue of categorising them in given sorts (ibid., p.243). Which in turn would not allow to deem what is normal and abnormal. In Wittgenstein’s (1986, §242) words “if language is to be a means of communication there must be agreement not only in definitions but also (queer as this may sound) in judgements.”

Using an example from Haugeland (2013, p. 6), let’s consider normativity and shared categorisation in a chess community. Players need to know which piece is which (e.g., king, queen, pawn), what squares and directions are, as well as what counts as a move. A king has a designated starting position, it can move in any direction, but only one square at a time. It must be always protected, it cannot go to an “endangered” square and if it is compromised you lose the game. From this, one can construe that the king as well as all the other pieces are involved in a variety of norms (e.g., how a king ought to move, how it is supposed to be protected). All of which are identifiable thanks to being categorised in sorts, that are interrelated (e.g., allowed movement, starting position are always in relation to the movements of the other

pieces). “A sort that is involved in many interrelated norms can be understood as a role” (ibid. p.6). In other words, roles are assignments that define what a thing/person is, based on the way they are supposed to behave or be used (ibid., p.36).

Notice that chess is playable thanks to people *conforming* to utilising shared conceptual categories and behaving in agreement to a host of norms and roles (Stavrakakis, 2008, pp. 1039–1041). If one deviates, they are marginalised as a cheater or someone who does not know how to play chess (see also Lok & De Rond, 2013). This sort of conformism, use of categorization and censorship can be observed in all social engagements. In the army, if you are a private you salute the sergeant, and if you are a sergeant you salute the officer, or else there are repercussions. The debtor is supposed to repay their creditor thanks to the norm of ownership – if not there are consequences (e.g., indictment). Under normal circumstances in most Westernised countries, the government is given power by the citizens thanks to the norm of democracy – otherwise there are consequences.

Roles and norms are not, however, restricted only to how people behave. People attribute roles and norms to tools too (Dreyfus, 2017a, Chapter 1; Haugeland, 2013). Spanners, screwdrivers, hammers, gearboxes, breaks, bonnets, engines are all interrelated in “a nexus of intertwined roles, instituted by the norms” of the practice of engineering. Breaks are for slowing down vehicles, a hammer is for hammering, a screwdriver is for screwing, a bonnet is for protecting the engine of a car. The reference to each other and to the practice as a whole is what “makes them what they are” and as a result “what they are for” (Dreyfus, 1991; Haugeland, 2013, p. 6; Taylor, 1995). Each element of a practice has traces of the other elements – thus to invoke something is to also invoke the totality of elements that constitute a Practice. A Practice necessarily refers not only to itself and its constituents but also to the rest of the practices of a context (Dreyfus & Taylor, 2015; Nicolini, 2012; Taylor, 1995). That is because, something is what is because it is not what it is not. And we have seen that what thing is for, is because of the ways in which it is normal to be used or

do (Wittgenstein, 1986, §19). Therefore, the totality of Practice (i.e., the relationality between norms, equipment and roles) is dubbed as the “referential nexus of significance” (Haugeland, 2013, p. 7), or more laconically, “significance⁵” (Dreyfus, 2017a, p. 28).

The above discussion suggests that improvisation should be viewed as a socially embedded practice (like the sociomaterial perspective), not a subjective mental process (unlike the cognitivist perspective). Unlike certain studies that elevate either the cognitive (e.g., Bechky & Okhuysen, 2011) or the material (e.g., Baker & Nelson, 2005) aspects of the social context for improvising, the above discussion allows us to see that social and material aspects are mutually constituted. This in turn indicates that sociomaterial aspects must be discussed in tandem when explaining improvisation. To enact bricolage (i.e., to join resources together) relies on drawing on existing conventions to understand what material aspects are for and how they can be used (see Baker & Nelson, 2005). Similarly, for members of SWAT teams to improvise by switching roles they must necessarily know how to operate the material equipment that is relevant to each role based on norms (see Bechky & Okhuysen, 2011).

Valence. Significance has a dual meaning. The first as explained above, is the meaning something has on the virtue of its social use. The second is the reason something is valued (i.e., its valence). But how is valence linked to practice (i.e., enacting roles in the normal way) and why do agents largely conform to it? As Castoriadis (2005b, p. 25) was at pains to point out, people do not accord with norms or take action just for the sake of it. This would reduce the complexity of the human condition to a form of functionalism, where significance is determined prior to history (Castoriadis, 2005b, p. 34; see also Dreyfus & Taylor, 2015, p. 150; Harari, 2014). As Nicolini and Monteiro (2017, p. 112) specify, “practices only acquire sense when organised around an end or object”. For example during the 16th and 17th century, Western Europe was largely consumed by religious fervour which legitimized feudal lords as

⁵ Heidegger refers to it as ‘*lichtung*’, whereas Charles Taylor (1995, p.77) refers to it as the ‘clearing’.

sovereigns (Toulmin, 1992, Chapter 2). In modern Western Europe sovereignty has passed from the nobility to the “nation” (Anastasiou, 2008, Chapter 2; Toulmin, 1992, p. 97). In turn the ‘nation’ is to a great extent consumed by an ‘econoscientific’ rationale (i.e., leveraging scientific knowledge to increase economic growth) where value free accounts of phenomena are ascribed value and which in turn are thought to offer leverage to sustain and expand the growth of the economy, which in turn is expected to increase the prosperity of the ‘nation’ as a whole (Castoriadis, 2005a, pp. 83–84; Harari, 2014; Komlosy, 2018, p. 25; Varoufakis, 2013, 2018).

From this brief description of the orientations of people in different epochs located in the same geographical area, one can construe that people behave in the ways they do because communities create “values that polarize and direct human lives” by conditioning people to accept certain significations as ‘worthy’ and ‘true’ (Castoriadis, 2005b, p. 25; see also Komlosy, 2018). As such like language, roles and norms - significations do not exist a priori (Chia & Rasche, 2010). Valence (or signification) is socially created, normative and incessantly re-enacted in practice (Gehman et al., 2013). Language and practices (which consist of roles and norms) are instituted as the tools at the disposal of agents to attain what is of significance (Klein Jr, 2015).

MacIntyre (2007) refers to what practice bestows value on, as “goods”. As Tsoukas (2018b, p. 9) noted, the MacIntyrean conception of Practice is “broadly aligned” with the versions used in organizational theory (see Beadle & Moore, 2006; Feldman & Orlikowski, 2011; Moore, 2017; Sandberg & Tsoukas, 2011). In an analysis of what Practice is, MacIntyre (2007, p. 187) illustrates that it is a “coherent and complex form of socially established cooperative human activity through which goods internal to that form of activity are realized in the course of trying to achieve those standards of excellence which are appropriate to, and partially definitive of, that form of activity”. To be a part of a Practice, people necessarily need to accept the value of its internal goods and to attain them, they need to *conform* to its standards which will be used to judge their performance. (ibid., p.190). Internal goods are goods which

cannot be acquired in any other way except from practicing in a specific way (Tsoukas, 2018b, p. 9; Yanow & Tsoukas, 2009, p. 1347). For example, the joy a potter feels when s/he makes a fine piece of pottery. Of course, Practice also has external goods such as money and fame. The difference of the latter is that they can be attained by being part of any Practice, whereas internal goods are specific to a Practice. However, as a number of scholars have argued subordinating a Practice to external goods is corrosive to the practice itself (MacIntyre, 2007; Tsoukas, 2018b; Yanow & Tsoukas, 2009). Therefore, Practice is always tied to a significance (i.e., valence) - the goods (both internal and external) are the significations that drive people to conform to ‘the spirit of their age’.

The thought of people “unavoidably bears the stamp of [their] age and geography” (Foucault, 2005, p. xvi). According to Haugeland (2013, pp. 44–45), the thought of individuals is immersed in the referential nexus of significance, they intuitively perceive these three things about their percept: (i) “normal ways” of interpreting, (ii) “normal constraints on what is possible and (iii) a general norm not to accept as true anything that would be impossible”. This is because a practice evokes signification. The latter “makes us immediately recognise a given phenomenon as a phenomenon...makes us immediately classify in this period objects, books, instruments, sentences of which we would otherwise know nothing and at the same time makes us immediately exclude an infinite number of others” (Castoriadis, 2005b, p. 45). It gives rise “to the simultaneous existence of an infinite set of possibilities and of an infinite set of impossibilities given immediately...by conforming to something like the spirit of the system” (ibid., p.46). In other words, *dwelling in Practice is the home of meaning* – it is what makes things appear as something that is for something and to be used in specific ways (see Dreyfus, 2017a, p. 28; Taylor, 1995, Chapter 4). It simultaneously opens and closes windows for action.

Consider the example of a medical student (Polanyi, 1958; Tsoukas, 2011a). The medical student, has grown up in a society that has a (pre)-

understanding of what a hospital and modern medicine are. This is thanks to participating in a community that has both such things and developed conceptual categories to designate what they are for. The student knows that hospitals are for treating people that are unwell by using scientifically tested methods - not for other purposes such as organizing raves with their friends. If someone was to assert the opposite, the student would probably consider the other person insane. So, if in the student's practice there were no such things as hospitals, doctors, nurses, scalpels, stethoscopes or the practice of modern medicine and science, how could the student choose to become a doctor? There would be no meaning to such a thing, because the whole referential nexus of meanings derived by participating in one way or another in modern medicine would be missing. Thus, the discussion in this section signifies that when agents improvise, they tend to do so for the sake of something they value. As discussed in the previous chapter, this aspect of improvisation has been severely overlooked because of the prominence of functionalist assumptions (see Visscher et al., 2018).

Emotions. Practices are “*teleo-affective*”. Indeed, emotions “connote ends and project affectively” (Nicolini, 2012, p. 166; see also Nicolini & Monteiro, 2017; Schatzki, 1997, p. 304). In other words, emotions are integral to learning and participating in a Practice (Benner et al., 1999, p. 15). This is because by participating in a Practice, agents learn to *care* about significations and as a result they are affectively moved by them (Tsoukas, 2018b, p. 2). That is, agents learn to feel good when they perform well or to feel disappointment when they make errors (Dreyfus & Dreyfus, 1986b). Knowledge of what is of significance, sterile of emotion, is not enough for agents to conform to normal interpretations of situations and thus perceive what the right thing is to do during action – emotion is a pre-requisite (Damasio, 1994; Frijda, 2007, 2010a, 2010b). The object of an emotion is itself “affective or normative” and emotion is intimately tied to judgement, said philosopher Robert Solomon (1973, p. 78). As a result, emotions also play a key role in sustaining the significations of good practice (Benner et al., 1999, p. 17), as well as interacting with equipment

appropriately (Lamprou, 2017). This is because emotions colour one's world (see Dreyfus, 1991; Heidegger, 2013).

Emotion as an aid to judgement, and by extension action, has not gone unnoticed in organizational psychology and is referred to as emotional intelligence (for a comprehensive review see Ashkanasy & Dorris, 2017). Meta-analytic results suggest that emotional intelligence offers incremental validity over cognitive ability and personality when it comes to predicting job performance (O'Boyle, Humphrey, Pollack, Hawver, & Story, 2011). Therefore, emotion is seen as way of assisting people to make distinctions and judge appropriate courses of actions (Ashkanasy & Daus, 2005; Colombetti, 2010; Goleman, 2004, 2006; Mayer & Salovey, 1995). Research highlights that emotional intelligences offers the ability (i) to monitor one's own and others' emotions, (ii) to discriminate among them, and (iii) to use the information to guide one's thinking and actions" (Mayer & Salovey, 1993, p. 433).

This is aligned to Paul Ekman's (1973) findings that suggest that people intuitively comply to their community's emotion rules. Emotion rules are tacitly taken for granted ways of etiquette of a community, that members are expected to maintain. Appropriate comportment is learned on the basis of growing up or spending time in a community. Ekman (ibid.) identified two types: (i) feeling and (ii) display rules. Both of which are argued to guide comportment. The former relates to what type and intensity of emotion one ought to feel under certain circumstances, whereas the latter relates to how much one can express themselves in different situations. As mentioned above, being able to judge how to behave is called emotional intelligence. But regulating one's responses to conform to what is expected based on one's role, is referred to as emotional labour (Hochschild, 2003). For example, for police investigators it is accepted that they can feel and display a certain extent of hostility at work (Holman, Martinez-Iñigo, & Totterdell, 2008, p. 302). This is not true for cabin crew on planes. Cabin crew are expected not to show any hostility despite potentially feeling that way towards a passenger (Hochschild, 2003).

Following the above, Solomon (2007, p. 21) maintains that emotions *are the product of habitual practice and consist of skilled judgements learned by being part of a community*. In other words, they are “not just mechanisms” but the result of learning to cope with the world in ways that are in relation to *norms and roles* (ibid. p.24). By a person dwelling in norms, enacting specific roles and knowing the significance of things, s/he develops expectations about how other people ought to behave. When people surpass, meet or fall short of these expectations, the situation is rarely encountered indifferently (see Colombetti, 2010, p. 148). *Judgement is enjoined with emotion*. For example, anger is the judgement that a person was treated unjustly (Solomon, 2007, p.14). Guilt is the judgement that a person has violated a higher authority (ibid., p.97). Fear is the judgement that one is in danger (ibid., p. 32). In fact, guilt and fear can be reactions to the potential repercussions of doing something “wrong” and prompting someone’s anger. Therefore, emotions are not only judgements about the world but also mechanisms for maintaining conformity to the social order (see Stavrakakis, 2008).

But emotions are more than that too – they “constitute reality” by appraising and valuing it in a specific way (see Colombetti, 2010; Komporozos-Athanasiou & Thompson, 2015; Shotter & Tsoukas, 2014a). For example, anger “makes the person at whom one is angry appear as infuriating. The hated person appears as hateful” (Solomon, 2007, p. 162). A dangerous situation is presented as fearful. In other words, the circumstances one faces, evoke intuitive emotional responses which colour the situation in a certain way (Frijda, 2009; Lambie & Marcel, 2002, p. 224). For example, during the Mann Gulch disaster, the fear experienced by the firefighters painted the situation as one that is hazardous and uncertain, because the possibility of using ‘normal’ ways to deal with fire were not proving useful (Holt & Cornelissen, 2014, p. 534). By presenting reality in a certain way, emotions make new possibilities for action seem more relevant than others (Solomon, 2004, 2007). By realising for example, that the fire was going to encircle them, the firefighters’ fear and anxiety about their safety, made the otherwise unthinkable option of dropping

their equipment and/or running away from the fire as relevant (Holt & Cornelissen, 2014; Weick, 1993b).

People that do not experience emotions like a 'normal' person would, are argued not to be able to respond to the situation normally/appropriately because the situation is not presented in the way it ought to (Solomon, 2007). Damasio (1994) illustrates that 'proper' judgement is not cleansed of emotion. Specifically, he retells how he tried to diagnose what was wrong with a patient - Elliot - who had suffered damage to his prefrontal cortices due to a surgical removal of a tumour. Prior to the surgery, Elliot "had been a good husband and father, had a job with a business firm, and had been a role model for younger siblings and colleagues" (ibid., p.35). However, during recovery after the otherwise successful surgery, to the surprise of his friends and family they discovered that "Elliot was no longer Elliot" (ibid., p. 36). Elliot's bizarre behaviour had little to do with the ability to move, talk and recall events – tasks he could perform no different, if not better than others. He needed to be told to get ready and go to work. He could not keep a schedule because when something he was doing called to be interrupted by something else, he would not stop dealing with the latter. For example, when sorting papers, he "could spend a whole afternoon deliberating on which principle of categorization should be applied". In a sense, it appeared he was "losing sight of his main goal" (ibid. p. 36). As a result, he lost his job and could not keep the ones that followed. He made a series of bad investments and lost all his savings. He got a divorce and ended up living with a sibling. He was not granted disability payments because he appeared normal. Although, he appeared normal, he did not learn from his mistakes as he constantly repeated them and was oblivious to the pleas of family and friends.

Elliot was brought to Damasio (a neuroscientist) after unsuccessful psychotherapy. Damasio put Elliot through a large number of tests testing his intellectual soundness. His IQ was in the superior range and in all the other cognitive ability tests he performed average or above average. Damasio then tested his personality using the highly regarded MMPI test, which again showed

a normal personality. After all these tests failed to show what the problem was, Damasio began suspecting that Elliot's intellect was intact but his emotions were not. Damasio found himself "suffering more when listening to Elliot's stories than Elliot himself seemed to be suffering" (ibid., p.44). After hours of observation and talking with friends and relatives it appeared that Elliot's neutral tone was not a matter of restraint. "He seemed to approach life on the same neutral note".

In fact, it appeared that Elliot was cursed "to know but not to feel" (ibid., p.45). So Damasio decided to explore this emotional detachment, by conducting tests responses to ethical dilemmas in the laboratory and on paper. Again, Elliot performed well in all. But all this was in stark contrast with how Elliot performed in real life situations. "Elliot was unable to choose effectively, or he might not choose at all, or choose badly" (ibid., p.50). So, the perplexed Damasio realised that what the deployed tests lacked was "the ongoing, open-ended, uncertain evolution of real life situations". As noted earlier this was true of trivial situations too, such as the sorting task at work where he would become side-tracked for hours. In Damasio's words "*as we are confronted by a task, a number of options open themselves in front of us and we must select our path correctly, time after time, if we are to keep on target*" (ibid., p 50, emphasis added). What Elliot had lost was the ability to judge how to choose a path appropriately. After examining, all the other known cases (12) which had damage to their prefrontal cortices, Damasio noticed a similar set of symptoms to Elliot – reduced emotional sensitivity that led to bad judgement. After more tests and comparison to the other cases, Damasio concluded that patients with similar brain damage cannot orient themselves appropriately in open-ended situations because they are not as sensitive to emotions about their future well-being.

The above shows that what is common sense, is not intelligible in the midst of action without feeling the emotions one ought to feel (this seems to have been anticipated since antiquity, see Aristotle, 2009). For example, thinking all afternoon which criterion to use to organize files would not be

presented as a valid option to someone that felt accountable and under pressure to finish their task on time for their boss or client (Damasio, 1994). By not complying to the expectation of one's roles (e.g., finishing filing on time) because one does not read the situation as one ought to, one is likely to be marginalised (e.g., losing their job). Therefore, emotions are intelligible on the basis of people's exposure to Practice – understanding what is expected of them in their roles given what is of value (Haugeland, 2013; Solomon, 2004, 2007). In sum, understanding the entwinement of emotions with Practice can serve as the groundwork for beginning to understand the role of emotions in improvisation. This is important because we know little about how emotion affects improvisation (see Cunha et al., 2017).

Summary of Participation in Practice and its Relation to Improvisation.

In sum, a practice is not something that is private inside a person (aka subjective), nor a separate physical entity (aka objective) – it is a socially constructed way of experiencing a context by acquiring a skilled way of perceiving and doing things that is emotion and value laden (Dreyfus & Taylor, 2015; Schatzki, 2005, p. 470; Taylor, 1995, Chapter 4,6; Wrathall, 2017). It is the semantic context that allows things to show up as significant - intelligible and valuable (Benner et al., 1999, pp. 15–17; Monk, 1990, p. 533). Hence, Practice provides the background against which improvisation is presented to an agent to be salient. Agents improvise by drawing on significations and their experienced emotions. In Polanyian terms, with experience one dwells in a practice which in turn allows them to see the meaning of situations (Polanyi & Prosch, 1977, p. 44). A person is subsidiarily aware of their past experience in a practice and therefore one necessarily *attends from it, to attend to* anything focally (Polanyi, 1965, p. 80). That is, *a perceptual ability to spontaneously integrate subsidiary aspects of a situation in order to behold a focal conception of it, as it is unfolding, in ways that are socially constituted*. Put simply, it is the sociomaterial distinctions (this will be discussed in more detail in the affordances section later) an agent has an intuitive grasp of, by *dwelling* in a socially acquired way of understanding a context (Tsoukas, 2011a; see also

Wittgenstein, 1969, §94). By being exposed to a similar education of perception, members of communities are able to attend from the same subsidiary elements to be able to have similar focal awareness (Pyrko, Dörfler, & Eden, 2017). Attending from this understanding can allow us to begin to understand the equally important role of social and material aspects (cf., Baker & Nelson, 2005; Bechky & Okhuysen, 2011), values (see Visscher et al., 2018) and emotions (see Cunha et al., 2017) in the process of improvisation.

3.4.2 Becoming a Skilled Performer of a Practice

It follows from the above that to become a competent member of a practice, one must learn to *dwell* in it (i.e., to become skilful). That is, to effortlessly perceive the manifestations of the context (e.g., behaviour, objects) against the backdrop of their normative connotations (Yanow & Tsoukas, 2009, p. 1347). Why? Things do not come with a priori labels (Haugeland, 2013). Labels and their meaning emerge in the way they are used in the social domain – *in Practice* (Gherardi & Nicolini, 2000; Nicolini, 2012; Pyrko et al., 2017). So to perceive meaning, one must learn and use labels in the way others are using them - according to the rules, not following them (Harré, 2002; Wittgenstein, 1986, §293). Therefore, meaning appears as social or communal - “ours” or “anyone’s” (Taylor, 1995, p. 77).

Without dwelling in a practice, one would not be able to respond to situations ‘appropriately’ (and thus, improvise), because they would not be able to perceive their meaning. Thus, experience and by extent developing “skills enable us to participate in a practice fluidly. But a practice is not reducible to a skill. It is rather the standing condition of the possibility of acting skilfully in a domain” (Wrathall, 2017, p. 4). By extension, to improvise in response to novel conditions necessarily relies on already being embedded in Practice. Otherwise, how would one be able to identify something as an improvisation and whether improvisation is required in the first place?

Knowledge, skill or expertise should not be confused with information or memory (Gibson, 2015a, p. 227; Tsoukas, 1997). Someone is not knowledgeable/skilful simply because they articulate information by recalling

it from memory. Knowledgeability/skilfulness is judgement (Tsoukas & Vladimirou, 2001). Being knowledgeable, skilled or an expert, relates to the ability of a person “to situate...information, and understanding its meaning, within the context of a direct perceptual engagement with our environments” (Ingold, 2002, pp. 21–22). That is, to be perceptually sensitive to the idiosyncrasies of a circumstance. Ingold (ibid., pp. 21-22) argues that members of communities share their knowledge with newer members by showing things via “touch, taste smell or hearing” and embellishing the showcase with a certain narrative to help newbies learn how to perceive things in the ‘normal’ way (D’Eredita & Barreto, 2006; Tsoukas, 2009a). The latter serves as the baseline for how situations ought to be. This in turn, allows agents to understand when improvisation is necessary in order to restore situations to how their ‘normal’ state.

Over time, novices gradually become skilled and hence attuned to their environment in the ways that their mentors see, hear and feel things (Ingold, 2013, p. 2). So “what each generation contributes to the next, in this process, is an *education of attention*” (Ingold, 2002, p. 22). As a result, perception is not passive. By paying attention to something we enable it to show up on the basis of familiarity (Dreyfus, 1993, p. 26) - the experience of the past is present in the present (Polanyi, 1961, pp. 466–467). Shotter (1996, p. 301), drawing on Wittgenstein (1986), very effusively expresses the manner of this education: people “‘give commands’ (‘DO this,’ ‘Don’t do that’);...‘point things out’ to people (‘Look at this!’); ‘remind’ them (‘Think what happened last time’); ‘change their perspective’ (‘Look at it like this’); ‘place’ or ‘give order’ to their experience (‘You were very cool . . . you acted like a madman’); ‘organize’ their behaviour (‘First, take a right, then . . . ask again . . .’); and so on. All these instructive forms of talk ‘move’ [people], in practice, to do something [they] would not otherwise do; in ‘gesturing’ or ‘pointing’ toward something in [their] circumstances, they cause [apprentices] to relate [themselves] to their circumstances in a different way...[they]are continually being ‘educated’ into new ways”.

Dreyfus and Dreyfus (1986b, p. 19, 2005) elaborate on how perception is educated. They argue that a person's perception of a task is transformed as the person spends more time attempting to master it (see Table 1). In the beginning a person is constantly trying to understand what to do next. To decipher what to do next, beginners usually draw on decontextualized rules in the form of "if X, do Y". As the person exerts effort to learn and receives some guidance, they gradually begin to become more sensitive to the differences between situations and begin to rely less on rules (Dreyfus & Dreyfus, 2005). As the aspiring expert recognises more and more nuances in encountered situations, they are able to react differentially to them (Dreyfus, 2017b).

The nuances do not need to be part of the observed field, they can be the result of the phenomenal presence of previous experience (Ribeiro, 2014, p. 579). With experience, a "gestalt shift" occurs (Ribeiro, 2014, p. 563). Put otherwise, their perception dwells in aspects of tasks which have recursively proved to be important that in turn change what the situation means and calls for (Ribeiro, 2017). As mentioned previously, experienced nickel miners can notice the yellowness of sparks emitted by the furnace, to identify when there is an overproportionate amount of slag. This alerts them that they must take care of the situation. Inexperience nickel workers cannot notice these nuances and, thus do not know how and when to respond (Ribeiro, 2014, p. 566). Hence, by attending from the salient details of a task, an "appropriately skilled" person instantaneously attends to the meaning of a situation and can intuitively respond to it (Tsoukas, 2011a) through improvisation.

TABLE 1
The Five Stages of Skill Acquisition by Dreyfus and Dreyfus

t	Novice	i. Application of context-free rules. ii. Focused on the process at hand. iii. No situational perception.
	Beginner	i. Application of context-free and situational rules based on circumstances. ii. Focused on the process at hand. iii. Limited situational perception.
	Competent	i. Conscious, selective application of rules based on salience. ii. Sees process in respect of future outcomes as well. iii. Increased situational perception.
	Proficient	i. Unintentional combination of processes based on nuances. ii. Calculative, long term orientation. iii. High situational perception.
	Expert	i. Intuitive grasp of whole situation. ii. Spontaneous reaction, no thinking required. iii. Grasps situation, envisions possibilities.

Note: Adapted from *Mind Over Machine: The Power of Human Intuition and Expertise in the Era of the Computer*, by Dreyfus and Dreyfus (1986). p.50.

Polanyi was originally a doctor, before becoming a chemist and later a philosopher (Nye, 2002). A good example of how perception is transformed is Polanyi's (1958, p. 101) narration of how, as medical students, their perception was trained to notice certain aspects of X-rays, so as to be able to diagnose pulmonary diseases. To do so, students would attend classes taught by radiologists in a dark room where the X-ray would be put on a fluorescent screen. In the beginning of the course, the student is "completely puzzled". S/he cannot see the lungs nor any signs of the disease that the radiologist is referring to. S/he can only make out "shadows of the heart and the ribs, with a few spidery blotches between them" – nothing else. This sensation is so strong that the student suspects that the radiologist is "romancing about figments of their imagination". With the passage of a few weeks and spending more hours observing the radiologists talk about different X-rays, a realisation strikes the student. S/he no longer pays attention to the outlines of the ribs, they become part of their subsidiary awareness. S/he is attending from the ribs to perceive

the lungs – it is like s/he “forg[o]t about the ribs and beg[a]n to see the lungs”. Eventually, with effort the X-ray is not a slide full of nebulous blotches in which you can perhaps make out certain organs. It becomes “a rich panorama of significant details” which give indications of diseases. Thus, the perception of the X-ray is transformed from a blurry set of details, to a manifestation of a chest. Even what the radiologist is talking about starts to make sense. By dwelling in their growing experience the student has “entered a new world”.

The result of being a skilled member of a practice is dwelling in taken for granted distinctions (Dreyfus, 2017b; Dreyfus & Dreyfus, 2005). This allows agents to unreflectively use distinctions as tools to see the meaning of situations and respond (Ribeiro, 2014; Willems, 2018). The person loses self-awareness. The tools they rely on become subsidiary aids to performance. In a sense, the self and any tools used “disappear” in the background of performance (Yanow & Tsoukas, 2009, pp. 1349–1350). Tools can be both material (e.g., X-rays, machinery) or immaterial (e.g., language/terminology, norms). In Heideggerian terms, this is the primordial way of being – people are unreflectively absorbed in responding to their mundane life (Dreyfus, 1991; Heidegger, 2013). Thus, during action the social structure is not separate from the agent – it is part of the agent.

As Arendt (1978, p. 50) notes, it is as if the agent has a “sixth sense” which guarantees what is perceivable by their other five senses to also appear in the same way to others. This sixth sense is in essence “common sense” or as Thomas Aquinas attested, “*sensus communis*”. By mastering the use of tools and by extension normative distinctions, the skilled agent can attend from the tools, to the meaning of the tasks at hand (Polanyi, 1966a). For example, while speaking or writing, an agent skilled in a specific language focuses on what they want to say, rather than focusing on the language itself. Similarly, an experienced diagnostician does not need to think about the blotches on the X-ray- they immediately make sense and afford a diagnosis (Polanyi, 1958, p. 101, 1966b, p. 10). Without dwelling in all the above distinctions agents would not

be able to improvise when the moment called for it (i.e., when things are not how they ought to be).

Breakdowns in Skilled Performance. Although becoming skilled is entwined with the ability to unreflectively see the meaning and respond to situations, this does not necessarily mean that skilled agents are not faced with situations in which they need to reflect before responding (Sandberg & Tsoukas, 2011, p. 342). “In unexpected situations, performances which under normal instances are fluid – break down” (Hadjimichael, 2017, p. 1362). The complexity of social systems results in unexpected configurations, that even skilled practitioners would be taken by surprise because of deviance from their expectations (Lok & De Rond, 2013; Sawyer, 2005; Tsoukas, 1998b). Three different types of breakdowns have been identified: (i) malfunction, (ii) temporary breakdowns and (iii) total breakdown. (Dreyfus, 1991, Chapter 4; Yanow & Tsoukas, 2009, p. 1351).

Malfunction refers to a momentary breakdown in performance as the result of a tool is unusable. During this type of breakdown, the agent is argued to quickly find another way of completing their performance. This is usually done by finding a different tool or asking for assistance. Consequently, performance is easily restored to its *absorbed-unreflective* state (Dreyfus, 1991, p. 72). For example, if a hammer becomes unbalanced one can easily grab another one, or can ask someone to bring one.

Temporary breakdown occurs when activity is temporarily blocked by something. During such a surprise, the agent gains self-awareness and equipment loses its transparency. The agent must *deliberately* pay attention to what they were doing and plan on how to continue. If the hammer one was using becomes unbalanced, but they do not have immediate access to another one, the agent must consider how to solve this problem while trying to perform their task (Dreyfus, 1991, p. 77).

Total breakdown occurs when activity is completely interrupted and cannot continue. During this type of surprise, the agent can become *fully detached* from the situation and *analytically* reflect on what caused the

breakdown. For example, the hammer-head becomes detached from the handle and cannot be readily reattached. The agent does not have access to another hammer. Consequently, the agent starts contemplating the characteristics of the hammer and tries to figure out why the two parts cannot be reattached.

All breakdowns have their roots in practical engagement and indwelling. They are the result of something that is taken for granted to behave in a given way, does not. During breakdowns, the agent differentially reverts their awareness from their focal task at hand, to the subsidiary constituents of the task depending on how severe the breakdown is. Malfunction only requires reconstituted absorbed coping. Temporary breakdown requires deliberation whereas total breakdown requires analytical reflection (Dreyfus, 1991, p. 79). Despite the severity of the breakdown, responses are always forged on the basis of socialisation into a practice's distinctions.

Breakdowns are fundamental to understanding improvisation (Sandberg & Tsoukas, 2011). This is because they present practitioners with moments in which situations deviate from how they normally ought to be and by doing so, manifest the logic tacitly taken for granted in Practice (*ibid.*, p. 343). Responding to breakdowns requires improvisation. The latter, often is achieved by reflectively considering what is relevant to restoring the situation to its 'normal' state.

In summary, acquiring experience in a practice allows one to perceive what is of significance and in turn develop a set of skills to deal with arising situations. Values and skills are passed on from member to member by drawing people's attention to nuances they had not noticed before. Thus, agents gradually develop a common sense of their surroundings. Beginners require conscious deliberation to see and respond to the meaning of situations. With experience agents can notice and thus respond to the meaning of a situation without thinking about it. Skills take the form of habitual dispositions which allow agents to spontaneously perceive the nuances of situations and intuitively respond to them in line with the normative elements of their practice. Agents may face breakdowns in their unreflective dealings with situations in cases of

surprise. However, responses to breakdowns are founded on the basis of already acquired skills (through socialization in practice). All the above is necessary for improvisation because it allows agents to identify when action is required and presents the means for restoring the situation to how it ought to be.

3.5 Affordances and Meaning

Following the above, an agent perceives their surroundings as infused with meaning – it is not experienced neutrally (Gueldenberg & Helting, 2007; Tsoukas, 2011a). Depending on the meaning of circumstances, agents are motivated to engage in or shun from action (Frijda, 2010b; Frijda, Ridderinkhof, & Rietveld, 2014; Shotter & Tsoukas, 2014a, 2014b). Aspects of an agent's environment spontaneously appear to be more relevant in addressing a situation over others (Fayard & Weeks, 2014) – especially during breakdowns. According to Gibson (2015a, p. 119) to perceive meaning, is to perceive *affordances*.

Affordances refer to the function of encountered aspects of the environment (Kaplan, 2011; Norman, 2013). However, to perceive affordances one must have the ability to do so. In most occasions, a person is able to non-reflectively perceive the function of encountered aspects of the environment because of dwelling in a practice which enables one to see what they mean ⁶ (Gallagher & Zahavi, 2008, p. 111; Rietveld, de Hann, & Denys, 2013). In other words, the meanings of situations as well as seeing affordances, are the perceptual manifestation of indwelling. Perceiving affordances, is tied to the semantic dimension of tacit knowledge which as implied above is a spontaneous process (even during breakdowns). This dimension, affects the perceptual field of people (Polanyi, 1966b, p. 68) by allowing them to spontaneously grasp potential uses of their surroundings (Chemero, 2003; Faraj & Azad, 2012, p. 250; Gibson, 2015a; Greeno, 1994), in relation to a situation's significance. Affordances may range from the use of objects and theories, to modes of

⁶ In Heideggerian terms, this is referred to as perceiving things as “ready-to-hand” (Heidegger, 2013, p. 69).

behaviour and interaction with people (Fayard & Weeks, 2007; Jones, 2003; Rietveld & Brouwers, 2017; Valenti & Gold, 1991). Put simply, “affordances are possibilities for action provided to us by the environment” (Rietveld & Brouwers, 2017, p. 546).

Affordances were previously examined by other scholars, they were conceptualised as being either ‘dispositional’ or ‘relational’ (Fayard & Weeks, 2014). On the one hand, scholars arguing that affordances are dispositional, argue that affordances are predispositions created by the environment (Chemero, 2003; Norman, 2013). For example, the affordances of objects and environments depend on their design. On the other hand, scholars arguing that affordances are relational, maintain that affordances are the result of abilities of agents (Faraj & Azad, 2012; Leonardi, 2011; Zammuto, Griffith, Majchrzak, Dougherty, & Faraj, 2007). For example, an object may be designed to do one thing, but it can be used to do other things too. As a result, affordances were seen to be separate to practices.

Like Fayard and Weeks (2014), I maintain that affordances should not be viewed as either dispositional or relational. Rather they should be viewed as both dispositional and relational because of their dependence on sociomaterial practices and semantic significance. However, in contrast with Fayard and Weeks (2014, p. 247) I do not seek to focus on the practice in which affordances are utilised. As already illustrated in previous sections of this chapter, my focus is on understanding how the agent embedded in practice draws on perception to improvise in response to unfolding situations. As a result, in this section I seek to synthesize insights from practice theory, phenomenology and the literature on affordances to create further analytical distinctions which will assist with the aim of my thesis.

Affordances do not exist independently of a practice – for otherwise, who would perceive them? Indeed, in many cases they are a niche of different forms of life (Gibson, 2015b, p. 120; Zammuto et al., 2007, p. 752). The social and the material, are imbricated and as a result agents are able to perceive and use affordances (Gaskin, Berente, Lyytinen, & Yoo, 2014; Leonardi, 2011;

Leonardi & Barley, 2010). Agents undergo an education of perception to see what certain things afford, why and when they are useful. Affordances are an embodied and socially embedded understanding of the totality of assumptions and skills one unreflectively takes for granted (Fayard & Weeks, 2014). Affordances are perceived after a process of immersion and learning (Dreyfus, 2002), which in turn enable one to spontaneously perceive and act upon affordances (Gibson, 2015a; Rietveld & Kiverstein, 2014).

This understanding is not static; by constantly dwelling in growing experience, one can perceive and by extension utilise more affordances (see Polanyi, 1961; Wrathall, 2014). A good example is the case of reading X-rays (Polanyi, 1958, p. 101). The same sheet can appear meaningful and useful to trained medical staff. This would not be the case for your average layperson. Without training, the X-ray simply appears as a set of nebulous blotches. Although, the layperson may understand that it is useful for a diagnosis, they themselves cannot make one. They would require the affordance of a trained doctor or nurse in order to utilise the affordance of the X-ray.

Following the above, affordances of objects or people are not perceived in a subjective nor in an objective manner – they are the result of immersion in sociomaterial forms of lives (Gibson, 2015b, p. 121). As Tiemersma (1987, p. 429) points out “the social is already there when we are to know or judge it. It is the past in which we are rooted anterior to any express evocation”. Affordances are transcendent (or transparent) in agents habitual engagement with their surroundings, but are also immanent - they can appear as possibilities for action, or reflection in breakdowns. All action relies on seeing the meaning of situations and responding via affordances (Dreyfus & Taylor, 2015, Chapter 7). This has implications for understanding for improvisation. It signifies that when agents improvise, they do so insofar as they utilise affordances.

Affordances of people or objects, are tied to social roles and assignments – ways in which affordances ‘ought’ to be enacted or used (Rietveld, 2008). On virtue of being a member of a community, one is accountable for how they utilise the affordances of their practice. Being answerable for one’s actions is

to be responsible for which affordances one chooses to use (Haugeland, 2013). A hammer can be used to drive a nail in wood, but one would be held accountable if they were to use it to kill someone. A lawyer must speak politely to a judge – shouting at a judge is unlikely to go down well. But again, the acceptance of using a hammer to kill someone, or shouting at someone with a prestigious role depends on the circumstances. Using the affordance of something in ways that defy their normative use may be acceptable under certain circumstances. For example, if one uses the hammer as a way of self-defence or shouts at the judge to leave the courtroom because it is on fire. The circumstances change the meaning of situations and make certain affordances more relevant over others. To be able to detect and see the new meaning of a situation due to the change of circumstances is again the result of dwelling in a practice – it occurs spontaneously. This suggests, that even during improvisation agents need to take into consideration the conventions that surround the use of affordances.

In sum, agents dwell in sociomaterial forms of life. As a result, of socialisation, agents perceive all aspects of their environment as infused with meaning. Different aspects of a practice (e.g., objects, people), have different affordances. To perceive and use affordances people must undergo an education of perception. Although, there are many affordances offered simultaneously by the environment, relevant affordances can be perceived based on the meaning of a situation an agent seeks to address. This is especially pertinent to improvisation. It offers the beginnings of understanding how agents draw on their environment to improvise. However, affordances usually cannot be used idiosyncratically. This is because they are tied to social conventions – they have roles and assignments (see Haugeland, 2013). As such their use is differentially judged as appropriate depending on the meaning of circumstances and an agent's understanding of social conventions. This in turn, signifies that even during improvisation agents cannot completely ignore conventions.

3.6 Discussion: Conceptualizing Improvisation from Within

Following the above, I argue that dwelling in the experience acquired in Practice permits an agent to spontaneously perceive the meaning of situations and ways of responding to them - affordances. Indwelling is argued to be synonymous with taking for granted normative distinctions and skills acquired on the merit of being a member of a practice (Dreyfus, 2014; Ingold, 2002). By dwelling in experience of a Practice, agents can perceive the meaning of the ever-fluctuating circumstances of their everyday life and see which affordances are relevant to dealing with them. As illustrated by Yanow and Tsoukas (2009), skilful action is grounded in being unreflective. However, depending on the magnitude of an unexpected event, the practitioner has to mindfully reflect either in or on action, guided by their experience to perceive the meaning of situations and possibilities for action (see also Dreyfus, 1991).

Given that above I have argued that the meaning of situations opens certain possibilities of action via the manifestation of affordances, I suggest that when plans and expectations break down, practitioners improvise insofar as they are able to perceive the meaning of arising situations and act on affordances provided in awkward situations. For example, during the Mann Gulch disaster, Dodge understanding that his unit was facing a wildfire (not a ten o'clock fire) saw that an escape fire would afford safety.

Exploring tacit knowledge (as indwelling) and affordances of specific sociomaterial practices, permits the opportunity to offer an account of improvisation from inside the moment of improvisation (i.e., how it is lived/experienced). Thus indwelling in a practice presents possibilities for action (viz., affordances). The latter requires an intimate understanding of how action unfolds – an understanding of what is normal and what is a deviation from normality. As argued in the previous chapter, the dimension of how normativity is tied to indwelling, and in turn how these interrelate with perceiving solutions to unusual situations is underexplored (Benner et al., 1999, p. 15). Exploring improvisation in vivo is important because previous studies have not addressed the intricacies of how practitioners are able to perceive how

to respond to unexpected situations. As argued by Fisher and Barrett (2019), lived experience of improvisation has been overlooked – this also calls for a better understanding of emotions (Cunha et al., 2017) and values (Visscher et al., 2018). Put otherwise, most studies have offered accounts *of what* agents do in response to unexpected situations (e.g. Baker & Nelson, 2005; Bechky & Okhuysen, 2011), but *not how* exactly agents are able to perceive what to do in the moment. In addition, by developing a new situated account previous theoretical dichotomies such as structure and individual, explicit and tacit knowledge can be viewed conjunctively, rather than disjunctively (Tsoukas, 2017).

This chapter has sought to develop a preliminary understanding of how it is to be a situated agent that is embedded in a sociomaterial practice who is constantly faced with a change in circumstances. Each time circumstances change unexpectedly, the meaning of a situation changes (this is especially pertinent during instances of breakdown). In turn, the agent must improvise to stay aligned with normative restrictions by utilising affordances.

To outline the exact process of how this process unfolds theory requires supplementation with rich empirical data. This is because, theory cannot preemptively extend itself to account for the singularities of practice (Tsoukas, 2009b, 2016). Hence this study, seeks to draw on a rich ethnographic study in order to account for how improvisation unfolds in sociomaterial contexts in which agents are constantly required to enact responses to unfolding situations. By extension, as improvisation relies on affordances, and the latter depends on indwelling I seek to account for how the perception of affordances enables practitioners to improvise. By outlining the role of perception, meaning and affordances, a richer and deeper understanding of what occurs inside the moment of improvisation can be portrayed. In the next section, the current research question will be refined by considering the theoretical synthesis of this chapter.

3.7 Refinement of the Research Question

The purpose of this study is to address how organizational improvisation is enacted and lived ‘inside the moment’ of improvisation in ever-evolving sociomaterial practices. With the phrase inside the moment, I allude to the little understood process of how agents experience and perceive how to improvise ‘in the midst’ of action. To describe the process of how agents experience improvisation, a reference to both their sociomaterial infrastructure is required.

A term that takes into consideration of sociomateriality is the notion of affordances. As outlined in this chapter, perceiving affordances depends on dwelling in the relationality of the function of objects or people that is entwined with learned social practices, valences and goods. The complexity of situations calls for differential reactions in each situation. To react one must draw on affordances, however, the sociomaterial environment simultaneously offers an agent many different affordances. As a result, in order to respond appropriately, an agent must have the ability to perceive which affordances are relevant. Hence, the first question the study seeks to address is:

(1.1) How do agents perceive relevant affordances for the enaction of improvisation?

Choosing the use of specific affordances in a specific manner is tantamount to choosing different courses of action. This is because each action is tied to using an affordance of something to complete or justify an action in relation to the valences of practices. Hence, the choice of different manipulation of affordances in each situation leads to different courses of improvisation. Capturing the process of how agents choose to manipulate affordances each time they improvise will offer an account of improvisation practices. This complements the first question, by showing how the perception (viz., immanent experience) of affordances is tied to enacting improvisation. Thus, the second question the study seeks to address is:

(1.2) How does the use of affordances influence the enaction of improvisation practices?

Following the above research questions and theoretical rationale, the next chapter will be dedicated to outlining the rationale for the empirical design and analysis of this study.

3.8 Summary

Tacit knowledge is consistently linked with the ability of agents to perceive the meaning of situations and to know how to respond. Although previous research on improvisation has taken into consideration tacit knowledge; it has done so in a manner that overlooks how it perceptually unfolds in vivo and how it is tied to a practice. Therefore, although we have some accounts of what agents do in response to unexpected events, we do not have a complete understanding of how people know how to enact their responses. This is because, most accounts are retrospective (Cunha et al., 2006, p. 326; Holt & Cornelissen, 2014; Shotter, 2017) and approach improvisation as a *fait accompli* or at best, with a weak process approach (Langley & Tsoukas, 2017). Rare exceptions to this observation have researched tacit knowledge in line with the processual nature of living practice, however, they did not fully address how tacit knowledge affords improvisation.

In this chapter, by synthesising theoretical insights from phenomenology, practice theory and ecological psychology, I sought to introduce a language and to identify a set of processes which would allow this study to address aspects of tacit knowledge which were previously overlooked in relation to improvisation. I argued that in line with Polanyi's original conception of tacit knowledge, to better understand ongoing improvisation, tacit knowledge should be understood as an ongoing process of perceptual integration (Polanyi, 1965). People attend from subsidiary elements to perceive their object of attention focally. Focal objects are perceived based on immersion in a practice (Polanyi, 1958). As part of becoming a member of a practice, one learns normative distinctions which are tied to what is valued by communities (Haugeland, 2013). By tacitly taking these for granted, agents gain an emotional orientation to their surroundings based on the goods they value (Nicolini, 2012).

To preserve valued goods, people gradually develop habitual/skilled/non-reflective responses to circumstances based on normative distinctions (Dreyfus & Kelly, 2007, p. 53).

Because circumstances are constantly changing, agents need to differentiate their responses to situations to respond appropriately (Benner et al., 1999, pp. 10–11). If circumstances are unexpected, the fluid responses of skilled agents may breakdown. During breakdowns agents reflect on the situation to find a solution (Dreyfus, 1991; Haugeland, 2013; Yanow & Tsoukas, 2009). This was clearly illustrated in the Mann Gulch fire disaster. Realising that it was not a 10 o'clock fire, led to a disruption of normal ways of responding. Indeed, the latter triggered several unconventional responses. Unfortunately, only one was appropriate.

Situations are often addressed through affordances; the latter, include functions of objects or people (Fayard & Weeks, 2014). Affordances are infused with social meaning. Their use depends on social conventions of what is deemed to be appropriate (Rietveld, 2008). Consequently, I argued that perceiving possibilities for actions is tantamount to perceiving affordances. Hence, I suggested that when faced with difficult situations, practitioners improvise insofar as they can perceive their meaning and act on relevant affordances.

Drawing on the above conceptualisations from phenomenology, practice theory and ecological psychology, can offer a richer vocabulary to refer to tacit aspects of developing responses to situations. By doing so, sharper and more refined research questions were developed to address aspects of improvisation that have remained underexplored. In the next chapter, I will discuss the methodology for data collection and analysis.

CHAPTER 4: RESEARCH METHODS

“Reality, I thought, does not exist finite and ready, independent from us; it is crafted with the cooperation of Man; it is equivalent to the value of Man.”

Nikos Kazantzakis (2009, p. 446)

“For methods imply metaphysics; unconsciously they disclose conclusions that they often claim not to know yet. Similarly the last pages of a book are already contained in the first pages. Such a link is inevitable.”

Albert Camus (1979, p. 18)

4.1 Introduction

The purpose of this chapter is to outline the methods used and the rationale for adopting these as part of the empirical investigation of improvisation. As highlighted by a recent review, empirical investigation of organizational improvisation is still scarce (Hadida et al., 2015, p. 444). At the same time, theoretical research is argued to be limited in its ability to account for the singularities of organizational phenomena (Nicolini, 2011; Shotter, 2011; Tsoukas, 2012, 2016). Thus, this suggests that further empirical research is required so as to further the research on organizational improvisation.

An ethnographic approach was adopted for the study due to: (i) the nature of the research questions of the thesis and (ii) its ontological-epistemological (hereafter, onto-epistemological) assumptions. To illustrate the reasons for selecting an ethnographic approach, this chapter is organised as follows: first I will discuss the research design. This will then be followed by an outline of the research setting and data collection processes. Lastly, the way the data was analysed, ethics and trustworthiness will be considered.

4.2 Research Design

The purpose of this section is to illustrate the rationale for adopting a qualitative design, and more specifically, ethnographic techniques. First, I will discuss the differences between quantitative and qualitative designs, and then justify the

rationale of choosing ethnographic techniques out of the diverse arsenal of qualitative methods.

4.2.1 Quantitative Versus Qualitative Designs

Empirical research on organizational improvisation is broadly dichotomized in two major approaches; quantitative and qualitative approaches. Both are underlain by very different onto-epistemological assumptions (Tsoukas & Chia, 2011), and, so, orient the attention of empirical investigations to very distinctive features of the phenomenon of interest. As Camus (1979) remarked the conceptions of the way we study a phenomenon “imply metaphysics; unconsciously they disclose conclusions that they often claim not to know yet” (see also Vahabzadeh, 2009, p. 454). That is, how we ‘picture’ reality leads us to asking the questions and accepting the answers we deem legitimate (Hadjimichael, 2017, p. 1365; Tsoukas & Chia, 2011, p. 3). By having awareness of the strengths and limitations of each perspective, the former can be capitalized on and the latter avoided. This section will briefly discuss the two competing approaches and explain why the qualitative was favoured for the purposes of this study.

As discussed in Chapter 2, the quantitative approach adopts a disjunctive conception of social phenomena. This means that the quantitative approach assumes that like natural phenomena, social phenomena can be segmented into distinct modules that have quasi-causal relationships (Tsoukas, 2017). To do so, this paradigm seeks to abstract the unique features that characterise a phenomenon in order to subsume them under a generic category. The generic category represents a phenomenon as a *fait accompli* and as a result overlooks the process through which it unfolds. Such an approach tries to answer the question of “what is this a case of?” (Tsoukas, 2009b, p. 289). That is, scholars utilising the quantitative approach, are called to categorize their *objects* of investigation under categories which have already been defined in the literature (see Rodgers, 2010). The latter is assumed to diminish the researcher’s subjectivity and as such guarantee the objectiveness of his/her findings. Notice, the underlying purpose of this research practice, is to provide allegedly ‘*value*

free' parsimonious outcome explanations by subjecting specific phenomena under general laws (Tsoukas, 2012, p. 68). For instance, the more training offered in improvising, the more likely it is that staff will enact better quality improvisations (see Vera & Crossan, 2005).

While some qualitative approaches seek to emulate the deductive rationale of quantitative approaches described above (e.g., Yin, 1994), to a large extent, abductive and inductive qualitative approaches (e.g., Gioia, Corley, & Hamilton, 2013; Timmermans & Tavory, 2012) adopt a conjunctive conception of social phenomena. That is, they seek to illustrate *how* otherwise compartmentalised modules are inseparable and interconnected while unfolding in practice (Tsoukas, 2017). The emphasis of abductive and inductive qualitative approaches is on comprehending “*what is going on?*” and *how* this occurs (Tsoukas, 2012, p. 72; Watson, 2011). This in turn, orients the researcher’s attention to the *specificity* and *uniqueness* of the investigated phenomenon (Shotter, 2005a). The abductive and inductive qualitative approaches have the freedom to not *always* subsume phenomena under a pre-configured category. Thus, many inductive and abductive qualitative accounts generate *complex* explanations which are sensitive to the uniqueness of *particular cases* (see Cassell, 2004; Miles & Huberman, 1994; Nicolini, 2009b). As such, abductive and inductive qualitative theorising are more likely to generate new distinctions and as a result hone our understandings of what is already known (Tsoukas, 2009b, p. 286).

Given that in Chapter 2 and 3, I have argued for a situated approach (i.e., a contextualised and conjunctive account of behaviour) to studying improvisation; for the purposes of this study I have opted for an abductive qualitative approach. The reason an abductive qualitative approach was selected, instead of an inductive approach, is due to the fact that researchers are not *tabula rasas*. Inductive approaches advocate “letting new theory emerge from data without theoretical preconceptions” (Timmermans & Tavory, 2012, p. 168). This is highly unlikely, especially since researchers study phenomena in reference to a skillset developed in reference to their past experiences within

their specific research communities. Thus, a situated approach is compatible with the abductive qualitative approach for three reasons: (i) the assumption of situational uniqueness, (ii) the assumption of the ineffability knowledge and (iii) the assumption of value immersion.

Situational uniqueness refers to the fact that organizations are constantly faced with unexpected and novel situations (Tsoukas, 2016). To an extent, this is an inherent feature of organizing. Notice, organizations seek to regulate the otherwise unruly human behaviour, by instituting certain routines and developing cognitive categories (e.g., patient) for their members to execute and utilise. Hence, unexpected events result from instituting expected responses (Weick & Sutcliffe, 2007) to an open-ended world (Hadjimichael, 2017; Tsoukas, 1998b). Due to the open-endedness of the world, organizations cannot solely rely on already established procedures. This is because each situation is uniquely configured in a way that is at least slightly different to previously encountered ones. Consequently, members of organizations must rely on their judgement to find an appropriate way to deal with newly arising situations – in other words they are necessarily called to improvise. Therefore, due to the nature of improvisation and its pervasiveness in organizations, deductive methods would not be appropriate for studying this phenomenon. This is because, to understand improvisation we must not only grasp regularities but also singularities. Given that abductive qualitative methods encourage both the incorporation of past research insights, as well as showing sensitivity to the uniqueness of circumstances, they are deemed more appropriate for the purpose of further developing an understanding of organizational improvisation.

The ineffability of knowledge refers to the fact that knowledge in practice, is process-based and entwined with the context in which it was cultivated. In other words, knowledge is not an entity that can be abstracted from its context. Due to the variability of situations faced, a different response is required in each case, which cannot be captured by a rule alone as this would lead to the problem of infinite regress (Kiverstein & Wheeler, 2012; Tsoukas, 1996, p. 16; Wittgenstein, 1986). This is because knowing is an *overdetermined*

social process where social distinctions overlap with each other. That is, to know is dependent on participating in several sociomaterial practices that tacitly attune agents to perceiving their environment in specific ways that habituate them to respond to situations by taking for granted certain symbolic criteria and functional strategies (Castoriadis, 2005b; Harré & Gillet, 1994; Ingold, 2002; MacIntyre, 2007). Thus, knowing is always routed in tacit knowledge acquired from socialisation. Although, one can reflect and articulate aspects of it, it is always grounded in tacit knowledge. Tacit knowledge is especially important for knowing how to deal with a situation – especially if novel or unexpected. This is because to know how to respond, depends on grasping the largely tacit intricacies of situational sensitivity (Hadjimichael & Tsoukas, 2019). Hence, preconceptions are key to the practice of qualitative research, which is perhaps overlooked by inductive approaches because they suggest detachment from them. Therefore, to be able to capture contextual sensitivity, abductive qualitative approach is better equipped for this task as it seeks to preserve the complexity and singularity of studied phenomena in reference to past findings on the topic and past experiences of the researcher.

Value immersion refers to the notion that all agents necessarily perceive their environment in a ‘value ridden’ manner (Castoriadis, 2005b; Ingold, 2002; Vygotsky, 1978). This is because all agents are necessarily communards; participants in institutionalised forms of lives; i.e., sociomaterial practices (Harré & Gillet, 1994; MacIntyre, 2007; Nicolini, 2012). As a number of scholars have established, different communities have their own ways of bestowing importance on elements of their practice by establishing which versions of truth are considered legitimate (Foucault, 1995, 2003; Solomon, 2007; Toulmin, 2001). Given that perception and consequently all knowledge, is tempered by the participation of agents in practices, there can be no objective account of any phenomena (Nagel, 1986). They are all relative to the conceptual and symbolic distinctions that can be found in any given sociomaterial practice. Therefore, I cannot utilise a deductive approach to study practices that are value ridden. This is because such approaches seek to regress the complexity of

practice to the identification of abstract factors and therefore filter out values, or treat them as 'noise'. The reason for this tendency, as discussed above is because the deductive approach seeks to offer objective accounts of social phenomena which have no place for values because they are considered to be biased. In a similar vein, inductive qualitative research overlook that researchers do not operate in vacuums by insisting that researchers should approach phenomena without preconceptions. On the contrary, the abductive qualitative approach is more reflexive by acknowledging that researchers have pre-conceptions, and in parallel does not seek to eliminate values from its accounts as they are considered to be key to a researcher's investigation.

4.2.2 Opting for Ethnography

Out of the diverse arsenal of qualitative methods, I have selected ethnographic techniques. These techniques can trace their lineage to early twentieth century anthropology and sociology (Robson, 2007), but were later adopted by other fields such as psychology and organizational theory. These techniques entail the study of groups of people from involved researchers observing and dwelling amongst the subjects in which they were interested in for a considerable amount of time (Guba & Lincoln, 1994). During fieldwork researchers attempt to record, interpret and comprehend the contextualised idiosyncrasies of the way of life of the group of interest and thus try to portray the meaning attached to these idiosyncrasies. To do so observation as well as interviews on a small scale are employed in order to complete the objectives of the study (Atkinson & Hammersley, 2007).

A singular definition of ethnography is a tricky endeavour; ethnography may be generally understood as a collection of qualitative research techniques which primarily rely on observation and aim to capture, interpret and comprehend the way of life (actions and explanations) of a certain group of people within their natural setting (Atkinson & Hammersley, 2007). This is done by utilising the data collected within that setting and the first-hand experiences of the researchers who collected the data (Miles & Huberman, 1994; van Maanen, 1979, 2011; Yanow, Ybema, & van Hulst, 2012).

As my thesis is preoccupied with understanding the experience of agents during improvisation within grounded settings and social practices, ethnographic techniques (i.e., observation in combination with interviews) are the most suitable techniques capturing this (Heritage, 1984; Llewellyn & Hindmarsh, 2010). Ethnographic techniques enable the researcher to have a spontaneous grasp of local meanings. This in turn allows researchers “to know what questions to ask” in the interviews (Guest, Namey, & Mitchell, 2012, p. 80). This is the case because ethnographic techniques permit the researcher to become a member of the practice of his/her study (Moeran, 2009). By spending a significant amount of time in the field, the researcher like any newcomer to a practice undergoes an “education of attention” by learning to notice what is of importance to the agents s/he is studying (Ingold, 2002; Lave & Wenger, 1991; van Manen, 1990). This is particularly important when studying improvisation because the researcher needs to distinguish between standard practices and deviations from them.

By taking for granted the ‘normal’ ways of practicing, the researcher can better understand which ‘resources’ agents draw upon to deal with unusual or unexpected situations (see Nicolini et al., 2012). Consequently, by being immersed in the context of interest the researcher can grasp the complexity and nuances of agents’ behaviours by generating accounts of practice that maintain overcome dualisms (Tsoukas, 2017, p. 132). By attending from the complexity of grounded practices the researchers is especially exposed to how “the mind and the world cannot be disentangled” (Tsoukas, 2017, p. 138) and that responses are not determined by the environment, nor that agents are self-interested information processors (Tsoukas, 2005, Chapter 16). Thus, ethnographic techniques allow the researcher to remain faithful to the basic thesis of the situated approach.

4.3 Research Setting

To empirically study organizational improvisation, an ethnographic study along with theoretical sampling (i.e., choosing cases based on the possibility that they

will offer new theoretical insights) was deemed appropriate (Eisenhardt, 1989, p. 537). The selection of the setting was conducted based on the following criteria: (i) The setting requires dealing with potential problems on a short notice. By requiring speedy solutions to arising problems there is an increased likelihood that improvisation will be enacted (Cunha et al., 2006; Tsoukas, 2013). (ii) The setting hosts a complex activity – increased complexity, requires more complex adjustments in the case of improvisation. Consequently, gathered examples are richer and more illustrative (see Hutchins, 1991; Weick, 1993b; Weick & Sutcliffe, 2007). (iii) The consequences of not responding to a situation appropriately are severe. This suggests that responding to unexpected situations is important to the agents.

Following the above, I selected to conduct an ethnography of an ATC team of an international airport in the European Union (EU). Its name and location cannot be disclosed due to both confidentiality agreements and ethical reasons (this will be further discussed in section 4.7). The ATC team is responsible for the safe and expeditious transit of aircrafts from and to the airport, by instructing planes on which airways and altitudes to maintain so as the possibility of delays and crashes are minimized (Nolan, 2011; D. Smith, 2015).

The ATC setting meets the criteria outlined above (see table 2). First, the setting requires immediate responses in the case of unusual or unexpected developments. Specifically, aerodrome ATC have a matter of seconds to respond to unexpected situations to ensure not only that the flights are on schedule, but also to safeguard safety (Kontogiannis & Malakis, 2013). Second, ATC utilises complex procedures that have inherent uncertainty: (i) constant call to implement the legal requirements and internal quality standards and (ii) dependence on different agents to accomplish tasks. In particular, air traffic controllers not only need to juggle the local idiosyncrasies of their airport, but are also legally required to utilise the guidelines of the International Civil Aviation Organization, in conjunction with operating technologically sophisticated equipment (Kontogiannis & Malakis, 2013; Malakis,

Kontogiannis, & Kirwan, 2010b; Owen, 2018). ATC requires complex technological systems such as communication systems, weather monitoring systems, flight information systems as well as navigation tracking systems and aids (Nolan, 2011; Owen, 2018; D. Smith, 2015). Lastly, the consequences of not responding immediately to unexpected situations result in severe outcomes. In the case of ATC, the lack of an immediate response may have a range of negative outcomes ranging from loss of life to huge financial incursions (Malakis et al., 2010b; Malakis, Kontogiannis, & Kirwan, 2010a).

TABLE 2
Summary of Setting Characteristics

Characteristics	
Time Pressure	<p>Immediate Responses</p> <ul style="list-style-type: none"> • Need to respond to irregularities to reduce danger to the safety and expedition of flights.
Complexity/Uncertainty	<p>Internal Sources</p> <ul style="list-style-type: none"> • Heavy Technological Dependence: Communication systems, Navigation Aids, Navigation Tracking Systems, Weather monitoring Systems, Flight Information Systems • Rapidly Escalating Situations • Ongoing and parallel collaboration with other departments increase likeliness of unexpected situations <p>External Sources (dependence on human and non-human agents to complete tasks)</p> <ul style="list-style-type: none"> • Area Air Traffic Control • Superordinate Air Traffic Control • Airline Companies • Airport Operator • Fire Service • Weather
Negative Consequences	<p>Death or severe physical harm</p> <p>Severe psychological distress</p> <p>Large financial costs</p>

4.5 Data Collection Process

To understand a sociomaterial practice, one must comprehend what is taken for granted in that setting and bring ‘it to the fore’ (Nicolini, 2011, 2012; van Maanen & Kolb, 1985). To be acquainted with the knowledge of the participants of the setting, a significant period of time is required in the field (see Ribeiro, 2014). This is because the researcher is called to become attuned to both the discursive singularities of the practice, the organization routines that constituted the sociomaterial practice, the equipment used, as well as the symbolic distinctions that underlie sociomaterial practices of each organization (Collins, 2011; Garfinkel, 1967; van Maanen, 2011). Hence, a longitudinal design was adopted – I spent 7 months in the setting and conducted the ethnography in three stages.

In the first stage, (the first two weeks) I spent time ‘hanging out’ with the participants and conducted informal unstructured interviews in situ for two reasons: (i) to become acquainted with the participants and (ii) to understand their concerns at work. In the words of van Maanen (2011, p. 219), participants are “often initially recalcitrant and suspicious of those who come uninvited into their lives”. As several participants had later told me, initially, they did not trust me. To test whether I was trustworthy, they told me fake stories in order to see if I would leak them. As I did not, the participants started to trust me more. Thus, without developing trust with the participants, researchers are unlikely to be allowed access to the natural behaviour of their participants at work (van Maanen & Kolb, 1985). Therefore, during the first two weeks my goal was to make the participants feel comfortable around me by explaining the basic elements of my project and getting to know each other on a more personal level.

Apart from building a relationship with the participants, by ‘hanging out’ and conducting informal interviews I was able to become initiated into a setting that was alien to me. With no experience in civil aviation, I found the first weeks a challenge, as the participants used terminology and enacted routines that were unfamiliar to me. Without posing questions to the participants and in turn, them

explaining what was going on, I would not have had been able to make sense of what they were doing and why. For the majority of the informal interviews, I took notes on my tablet (which were immediately expanded on after the interview). The reason for this was to avoid intimidating participants by flaunting a recording device before they trusted me.

In the second phase, I gradually became a partial-participant observer of the activities of the contexts. As a partial-participant I was allowed to participate only in some activities [e.g., runway inspections - checking for debris on the runway; passing strips (see 9 in Glossary) from assistant controllers to controllers], while in the rest of the activities I was a passive observer (I was given passive observational access to all the sociomaterial resources of the team). Specifically, I was permitted to read the daily mail, participate in their training as well as to have access to parts of their archives.

To ensure my understanding of the team's practices I shadowed different members of the teams on a daily basis. The ATC team worked on a rota basis. Five groups of approximately four to five controllers and two assistants alternated staffing the tower every 12 hours. Each group had at least one very experienced member (over 10 years of experience), two moderately experienced controllers (3 to 5 years of experience), two less experienced controllers (0 to 2 years of experience) and two very experienced assistant controllers (over 8 years of experience). During a shift, controllers work in pairs with one assistant for an hour. They rotate every hour to ensure that they rest for at least an hour before they are active again. This is important because controlling requires extremely high levels of concentration and attentiveness.

I ensured that I observed all groups on cyclical basis and that during each shift I observed each controller for at least one hour. The reason for this was to ensure that I noticed any differences in controlling, especially in terms of levels of experience. Levels of experience were important because they have been associated with different levels of skilfulness and tacit knowledge (Dreyfus & Dreyfus, 2005; Ribeiro, 2013a, 2013b). I also observed assistants more sparsely, an hour per week. I focused more on controllers because they were

actively engaged in controlling, and thus improvisation while controlling, whereas assistants were not. Assistants supported the controllers by engaging mostly in bureaucratic activities (e.g., updating arrival times, preparing strips, answering phone calls). The difference between controllers and assistants will be explained in the next chapter. For a breakdown of how much time I shadowed members of the team depending on their role and levels of experience see Table 3.⁷

TABLE 3
Information about Shadowing and Interviews

Role	Experience	Shadowing	Interviews		
	<i>A = 0-2 years</i> <i>B = 3-5 years</i> <i>C = 5-9 years</i> <i>D = 10+ years</i>	<i>In hours</i>	Unstructured about		Semi-structured
			Mundane Incidents	Abnormal Incidents	
ATCO*		502	5	24	23
	A	201	0	10	8
	B	170	2	6	7
	C	52	1	3	2
	D	79	3	5	6
ATCA**		28	0	24	5
	A	N/A	N/A	N/A	N/A
	B	5	0	3	1
	C	13	0	10	2
	D	10	0	11	2

Note. *Air traffic control officer; ** Air traffic control assistant

Various scholars highlight that shadowing is a powerful tool for understanding the interaction of people with other people or objects, the roles of people or objects as well as the perspectives of the participants (Czarniawska, 2014; Vasquez, Brummans, & Groleau, 2012). Indeed, by shadowing and assisting the participants (where allowed), I was not only familiarised with the

⁷ It should be noted that the reason I have spent more time shadowing controllers with less than 5 years of experience, rather than controllers with over 5 years of experience is because most controllers that reach 5 years of experience are transferred to a different unit. Thus, there was a scarcity of controllers with over 5 years of experience. Out of the 21 controllers permanently stationed at the unit, only 3 had more than 5 years of experience. To combat the shortage of experience, 10 controllers with more than 10 years of experience stationed at a different unit would take on 3 shifts a month at the observed unit.

terminology and significations of the context (see Glossary for examples of terminology and Appx 2 for examples of significations), but was also necessarily familiarised with the equipment used by the participants. This opportunity had arisen because routines, equipment and discursive distinctions are mutually constituted (Dreyfus, 1989; Riemer & Johnston, 2014). An organizational routine cannot be what it is without relying on all three (Orlikowski & Scott, 2008). For example, the notions of control tower, approach procedures and safety are entwined – referring to one implicitly refers to all three at the same time (see Dreyfus, 1991; Rietveld, 2013; Taylor, 1995).

By being a partial-participant in ATC practices, over a period of approximately 6 months I became skilled at distinguishing between the way routines were supposed to be enacted (based on the written procedures) and the improvised enaction of the routines. Hence, the contrast between the written and the enacted, greatly assisted in the documentation of instances of breakdown wherein the teams improvised in response to. Breakdowns assisted in uncovering the rationale behind improvisation because it revealed taken for granted aspects of work (Sandberg & Tsoukas, 2011). In addition, rules required personnel to note in their logbooks major deviations from the written routines. This allowed me to triangulate whether an instance was indeed perceived as unusual or not. Documentation took place in-situ by writing field-notes, taking pictures on my tablet as well as recording unstructured interviews with the protagonists of each incident (Cassell, 2004; Miles & Huberman, 1994). To see the number of unstructured interviews in reference to the level of experience see Table 3. I expanded upon my field notes within 24 hours of each observation so as to ensure the reliability of my recollections and to maintain as much detail as possible (Emerson, Fretz, & Shaw, 2011; Vasquez et al., 2012; Wolfinger, 2002). My interpretations were discussed with controllers on a weekly basis to ensure their trustworthiness.

To document responses to unexpected situations I would rely on the following process. Upon realising that an unexpected situation was taking place I would remain close to the participant who was dealing with it. During this

time, I would take detailed notes of each (re)action the participant was initiating, along with the time at which it was occurring. Specifically my notes included: the participants, the actions, the unfolding dialogue, the equipment used, the feelings, body posture and facial expressions. When permitted, I would also take pictures. For safety reasons, I would not interrupt the participant while they were handling a situation. Detailing the above is key to understanding unreflective action, as well as emotional responses to it (Frijda et al., 2014, p. 2; Lambie & Marcel, 2002, p. 229). “To observe someone’s outward behaviour – if we understand them – is to observe their state of mind” (Monk, 1990, p. 548).

According to Benner and colleagues (1999, p. 21), participant’s narrative reveal their perceptions - what they “noticed” and how issues appeared to them. Thus, exactly after a situation, when possible, I would ask the participant to give me a brief explanation of what had occurred, which was also added to my notes. I would then agree on a date and time for conducting an interview about the situation. I made sure that the interview took place within 3 days of the incident to ensure that the participant would not forget important details. In addition to capturing the reflexive perceptions of the participants, conducting the loosely-structured interviews also assisted in triangulating the evidence gathered by observation (Miles & Huberman, 1994; Nicolini, 2009a). This is important because as an observer I only had access to a “slice of action of someone else”. Therefore, a solution is to include the reflections of the agents I observed (Vahabzadeh, 2009, p. 454).

During the interview, I had my notes of the situation. The reason for having my notes was because they ensured that during the interview no aspect of the situation was overlooked. To ensure the validity of my notes, first, I would show them to the participant to see if they agreed with my account. Corrections were made when deemed necessary. Most corrections centred around documenting instances with the correct aviation terminology. After this, I would refer to the (re)actions written in my notes and ask the participant firstly to explain what they perceived. Second, I would ask them how they felt. Third,

I would ask them what actions they took. Fourth, I would ask why they chose to respond in the specific way and finally, I would ask if they had thought of other possibilities of responding. Responses were audio recorded with the consent of the participant.

In the last phase of the study (during the last month), in parallel with the observation I organized additional semi-structured interviews with team members. I left most semi-structured interviews to the end of the study because I was familiar with the sociomaterial practices and I had specific instances of improvisation in mind that could be focused on and compared. Thus, it was easier to grasp what the participants discussed and I could ask better targeted follow up questions (Guest et al., 2012). In addition, by leaving the semi-structured interviews until the end I could ask participants to reflect on their development throughout the months I observed them. This allowed to capture, how their reaction to situations changed over time. With the participants' permission, all semi-structured interviews, except for one were recorded and transcribed. In total, I observed the ATC team for approximately, 530 hours. I conducted 28 semi-structured interviews along with numerous unstructured interviews. To see the number of interviews in reference to the participants' level of experience and role see Table 3 (above). For more details about the number and length of interviews and observations see Table 4 (below).

TABLE 4
Data Collection in Numbers

Type	Number	Average Duration	Total Duration
Observations	53	10.1 hours	530 hours
<i>1st Stage</i>	6	-	<i>61 hours</i>
<i>2nd Stage</i>	38	-	<i>383 hours</i>
<i>3rd Stage</i>	9	-	<i>86 hours</i>
Semi-structured Interviews	28	38 mins	1064 mins
<i>1st Stage</i>	0	-	-
<i>2nd Stage</i>	3	<i>29.3 mins</i>	<i>88 mins</i>
<i>3rd Stage</i>	25	<i>39 mins</i>	<i>976 mins</i>
Unstructured Interviews	52	-	-
<i>1st Stage</i>	6	-	-
<i>2nd Stage</i>	40	<i>5.6 mins</i>	<i>224 mins</i>
<i>3rd Stage</i>	6	<i>5.1 mins</i>	<i>30.6 mins</i>
Documents	39	-	-
<i>1st Stage</i>	2	-	-
<i>2nd Stage</i>	31	-	-
<i>3rd Stage</i>	6	-	-

4.6 Data Analysis

A theory building approach was adopted to enable the move from a descriptive account to an integrated theory of how organizational improvisation is enacted and experienced (Lok & De Rond, 2013, p. 192; van Maanen, 1979). The analysis was iterative and was conducted in three cycles; each involved a new round of re-reading all the collected data (Miles, Huberman, & Saldana, 2014). Due to the large volume of the data collected, Nvivo was used to organise and analyse the data.

The first step focused on distinguishing the differences between the written organizational procedures and their enactments, as well as instances of breakdown (Cunha et al., 2006; Sandberg & Tsoukas, 2011; Tsoukas, 2013). This was done by relying on my experience as a partial-participant and full observer and my notes. Following this, I went through the data and created

“time and context charts” for all episodes which showed major deviances from written the routines of the teams (Gkeredakis, 2014, p. 1482; Miles & Huberman, 1994). This assisted in understanding improvisation as a process that unfolds in time (Langley, 1999). Specifically, all episodes were put in the chronological order in which they occurred, and all actions taken with each were also chronologically noted. By doing so, I created a record of how improvisation was enacted, which in parallel, served as a broader archive of the improvisations that I had documented.

For example in Table 5, I display how I coded an episode that I subsequently analyse in the next chapter. The example in Table 5 refers to an abnormal situation, wherein an aircraft did not follow the prescribed procedures. In the table, step 1 (symbolised as “•” in table) entailed identifying aspects of the episode that deviated from the written procedures. In the columns with “•”, I display, in chronological order, segments of my fieldnotes or segments from interview transcripts which relate to the instance examined. For example in the first and fourth columns, one can see that the controller showed extreme signs of emotion (e.g., throwing pen, exclaiming loudly) and issued instructions to descend to an altitude below the minimum (2200ft). Both are highly abnormal behaviours in relation to written procedures.

The second step, focused on the instances of improvisation identified in step one and sought to recognise what the practitioners perceived that made them react in an improvisational manner. To this end, I adopted interpretive phenomenological analysis (IPA). This is because IPA allows to capture elements of daily experience, ranging from the reflective to the non-reflective (van Manen, 1990). IPA is a qualitative data analysis technique that has two goals. The first goal is to capture the experience and concerns of participants by focusing on specific events or processes. The second goal is to interpret the experiences and concerns of participants in reference to the social context (Larkin, Watts, & Clifton, 2006, p. 104).

I sought to identify the perceptual experience of the participant in each episode by paying specific attention to my notes taken in real time on

participants' body language, emotional reactions, where they focused on, the actions they undertook, as well as post-hoc reflections of the participants themselves. The unit of analysis was on the individual experience - emphasis was on the perceptual and emotional experience of the participants. To identify both types of experiences, I engaged in two cycles of reading, each with its own interpretive focus (J. Smith, Flower, & Larkin, 2009). Specifically, the first cycle of readings focused on identifying what the participants perceived in relation to the developments of the situation. Such elements included, the perceived implications of situations, which aspects of situations participants focused on as the situation unfolded, the perceived possibilities for action and the reasons for responding. This allowed me to interpret which affordances stood out for the practitioners and which ones they were drawn to use. For the second cycle of readings, I focused on the emotional experience of the participants. Elements coded included facial expressions, body posture, emotionally charged words and reflections on emotions.

For example in Table 5, step 2 is symbolised as “••”. In the second, fifth and sixth columns, I try to understand the experience and concern of the individual (emotional and perceptual) as the event unfolded. As can be seen in column 2, I note how the individual's emotions (e.g., shock, anxiety) changed as the situation unfolded. In column 5, I note which possibilities for action (i.e., solicitations: relevant affordances - more about this later) the individual attended to (e.g., issuing instruction of descending to 1000ft) at different points during the situation. Finally, in column 6, I note the concern of the individual in the event (i.e., to avoid a potential collision).

In the third and final step, I focused on the second goal of IPA. That is, to interpret the links between the descriptions of experience and concerns documented in step 2 with the wider social context (Larkin et al., 2006; J. Smith et al., 2009). Thus, a practice lens was applied to relay the experience of agents in relation to the significations of their form of life (Tsoukas & Dooley, 2011). The analytical unit was the socially embedded agent; the sociomaterial environment in sync with the agents (Ingold, 2002). This is because “we cannot

characterize behaviour independently of the intentions, and we cannot characterize intentions independently of the settings which make these intentions intelligible both to agents themselves and to others” (MacIntyre, 2007, p. 206).

Within this step, I focused on the links between the perceptions of the practitioners with the broader environment in which they acted. That is, I considered how the lore of the practice affected the way in which everyday activities were perceived. The lore included my data on what was discussed during the trainings, the war stories shared by the practitioners, the documents I had collected and how more experienced team members taught less experienced ones in real time. All the former are important sources for the collectively held values/goods of the practitioners as they exemplify what aspects of the situations are focused and which are overlooked. Consequently, apart from understanding the emotions, affordances and concerns perceived by the individuals, I could interpret how their reactions to situations are in sync with the practice of ATC.

For example in Table 5, step 3 was symbolised as “...”. In the seventh and eighth columns, I try to show the links between what was found in step 2 with broader practices of ATC. In particular, in column 3, in this specific event, I identify how the controller appraised their anticipation based on the lore of the practice and emotional reactions. Moreover, in column 8, I identify that the improvisations of the individual are related to different types of improvisation practices that I have found across other improvisation episodes. Each improvisation practice in this case was tied to preserving safety. More about both in the next chapter.

TABLE 5
Illustrative Coding with Sample Data

1	2	3	4	5	6	7	8
Steps •	••	•••	•	••	••	•	•••
Illustrative Quote/Note			Illustrative Quote/Note				
Themes →	<i>Emotion & Mood</i>	<i>Appraisal</i>	<i>Reaction</i>	<i>Solicitation</i>	<i>Concern</i>	<i>Improv.</i>	<i>Improv. Practice</i>
Angelo stands up in shock, his face drained of colour, eyes wide open. He throws his pen on the desk and exclaims loudly in frustration.	Shock, Frustration, Fear		00:00:00 “#2...., eeeeh #1, continue on present heading and descend 1000ft immediately! (louder, emphatically)	(i) Repulsive because of repulsion of #2 (ii) 1000ft attractive because #2 descending from 2000ft and no obstacles over sea (iii) appropriate phraseology	#1	(i) Breaks minimum altitude rule (ii) allows aircraft to fly opposite to eastern approach	(i) Disregard (ii) Introduction
“As soon as I realised what was going on, I panicked. My heartrate rocketed. For a second I thought I was going to lose it, but then it was as if somebody I woke me up with a start.”	Panic, Anxiety, Mood of attentive calmness	Negative Anticipation - crash jeopardised signification of safety for which Angelo cares about based on emotions	00:00:09 “#2 climb immediately 3000ft.”	(i) Repulsive because of repulsion of #1 (ii) 3000ft attractive because #1 is descending from (iii) appropriate phraseology	#2 Avoid Collision - Safety	(i) overlooks #2's direction change without instruction (ii) allows aircraft to fly opposite to eastern approach]	(i) Disregard (ii) Introduction
“It's shocking because its real, for a moment I thought I' m imagining it, but I looked again - it was happening and I urged myself to do something”	Shock, Mood of attentive calmness		“They are going to crash! Next thing I know, I did the first thing that came to mind...My first concern was to separate the aircrafts with altitude so they wouldn't crash”	(i) Repulsion of aircrafts to each other due to safety concerns (ii) Attractiveness of altitude adjustment			

Notes. Step 1 = •, Step 2 = ••, Step 3 = •••

In Table 6, I illustrate the general data framework derived from the analysis. It shows the process of data reduction – 17 first-order themes gave rise to 11 second-order themes, which in turn were organized in 7 third-order theme.

All 7 third-order categories are shown to be related to a fourth-order theme. Through a constant comparison between the collected data and theory I was able to identify instances of conceptual categories. First order themes were derived from recurring situations observed in situ and discussed in interviews. The latter were used as the basis for the second-order themes by integrating conceptual overlaps through abstraction. The process of abstraction was repeated for the identification of the third and fourth order themes. An illustration of how the thematization was conducted follows in the next paragraphs.

Consider the first row of themes in Table 6. Throughout the data, controllers were constantly using specific phrases and material resources in relation to rules in order to react to situations. The names of these phrases (“descend”, “climb”, “hold” etc.), rules (“approach”, “final”, “taxi” etc.) or material resources (e.g., “radio”, “telephone”, “strips” etc.) served as codes. Due to the abundance of each, they were categorized in themes based on their nature. For example, references to phrases were thematised as phraseology-use. The use of phrases, rules and resources varied from spontaneous to hesitant. Spontaneous use of each was thematised under spontaneity-in-use, whereas hesitance to use was thematised under uncertainty-in-use.

All three (i.e., rules, phrases and material resources) can be conceptualized as affordances (i.e., “possibilities for action”) (Fayard & Weeks, 2007, p. 609). Affordances are used due to the implications they are perceived to have on a situation. Thus, when participants used specific affordances I thematised these under affordances and when participants talked about the implications of their use, I sorted these instances in the implications of affordances. When participants discussed how they changed the use of any of the three over time and when I observed the differences between reactions of novice and experienced controllers, I sorted these instances in the experience as background theme. When participants spontaneously used an affordance or could not explain why they had done so, I categorized these instances under the

theme of intuition. Thus, the second order themes derived were affordances, implications of affordances, experience and indwelling.

Finally, I noticed that using affordances and perceiving their implications as well as refining their use with experience, entails both spontaneously anticipating their usefulness in a given situation and relying on past experience. Hence, the third order themes are anticipation, indwelling and solicitations. Circumspection, the fourth order theme is tied to all the other themes. The relation between the themes and circumspection will become clearer in the next chapter.

TABLE 6
General Data Framework

First-order themes	Second-order themes	Third-order themes	Fourth-order themes
Rule/Procedure-use	Experience as Background	Indwelling	
Material Resource-use	Intuition	Anticipation	
Phraseology-use	Affordances	Solicitations	
Spontaneity-in-use	Implications of Affordances		
Uncertainty-in-use			
Expedition	Goods	Concern	Circumspection
Safety	Emotions	Appraisal	
Accountability	Attentive Calmness (Mood)		
Positive Emotions			
Negative Emotions			
Minor Breakdown (or Malfunction)	Reflection in action	Reflection	
Temporary Breakdown	Reflection on action		
Total Breakdown			
Disregard	Mundane Improv.	Improvisation Practices	
Role Change	Critical Improv.		
Timing Adjustment			
Introduction of New Feature			

4.7 Ethics

Any research project that is social, raises the question of how to deal with the fellow humans involved. Researchers have established four pillars of ethical research (Bryman & Bell, 2011; Diener & Crandall, 1978). These being: informed consent, preserving anonymity confidentiality, protecting data and avoiding harm. I was careful to adhere to all four principles:

(i) Informed consent: Before the commencement of data collection consent and approval was requested and received from the organization. Participants were informed in person beforehand about what the study involved and what will be required of them. It was stressed that participation was voluntary and that they could withdraw at any time. No participant requested to withdraw.

(ii) Anonymity and confidentiality: To preserve anonymity and confidentiality, the names of both the organisation and the participants were not mentioned in any of my notes or documents - nicknames were used instead. In addition to nicknames, I also randomly changed the gender of participants in my descriptions.

(iii) Data Protection: To preserve data protection, the data collected was stored on an offline encrypted drive which was locked in a secure environment. All non-electronic data were stored in a locked office at the University of Warwick.

(iv) Avoiding Harm: To avoid harm, I did not interrupt the controllers while working. I made sure prior to each session that the controller was comfortable with my presence and I stressed that they could ask me to leave at any point. In addition, by anonymising and protecting the data I minimise the possibility of affecting the reputation of the studied organization or its personnel.

In addition to the four above principles, scholars have highlighted that ethnographers are prone to deception and/or even self-deception to collect the data required for their research. Gaining official access to a site is not always enough (Fine & Shulman, 2009, p. 181). To get data, researchers must build

rapport with their participants (Atkinson & Hammersley, 2007, Chapter 4). In particular, (i) it is highlighted that ethnographers may seek to make themselves appear as sympathetic to the participants, but when they come to write about what they saw, they dehumanize their participants (Fine & Shulman, 2009, p. 180). In addition, (ii) realist ethnographers (i.e., ethnographers that suggest what they saw is the single account of truth) may be pre-disposed to not try to understand their participants, by staying close to what they as researchers think the truth is (Fine & Shulman, 2009, pp. 189–190). The former is a case of deceiving the participants, and the second is a case of deceiving oneself by thinking they are the sole bearer of truth. In parallel, both are counter to the tacit rule of sympathetically understanding through the eyes of the informants (Wax, 1980, p. 278).

By being aware of these two dangers, I approached the participants in good faith and empathetically tried to understand how they related to their environment. In this way I tried, and to a great extent was able to understand the concerns and characters of the participants. To remain reflexive of my reactions and to offer a fair account of events, I kept a diary of what I saw and my feelings, so I could later be more aware of what may have influenced my interpretation (Atkinson & Hammersley, 2007, p. 151; Emerson et al., 2011, Chapter 4). In parallel, I shared my interpretations of observed events with the participants so they could corroborate my account.

4.8 Trustworthiness

It should be highlighted that, despite objections to using qualitative techniques because they are “too subjective” (see Kvale, 1994; Potter & Hepburn, 2005), I chose to utilise them because such objections seem to be based on a simplified conception of what scientific knowledge is (see Polanyi, 1964). As illustrated by Polanyi (1958), even the most seemingly scientific practice i.e. solving mathematical problems depends on: (i) a *personal* understanding of mathematics and (ii) participating in a commune that values executing the endeavour in certain ways (viz., developing one’s own judgement by

participating in broader mathematical practices). This signifies that all research techniques depend on a personal understanding, which in a sense does not necessarily mean that this is bad, so long as research is guided by shared and accepted standards (Cassell, 2004; Johnson & Cassell, 2001; Sandberg, 2005). Positivistic (i.e., objectivist methods) are no less interpretive or unguided by shared social conventions. The main difference of positivistic methods from the interpretive methods, is that the former have “sent into oblivion [their] own original foundation as an interpretative act” (Vahabzadeh, 2009, p. 460).

In order to establish that the analysis of the study was conducted in a trustworthy manner which adheres to the standards of the interpretative tradition, Sandberg’s (2005) framework for justifying knowledge produced by interpretive approaches was utilised. This framework requires the researcher to show evidence of: (i) “pragmatic validity” (whether what participants say they do, is actually what they do) (ibid, p. 56), (ii) “communicative validity” (coherence of researcher interpretations with available data) (ibid, p. 54), (iii) “transgressive validity” (seek contradictions within data in order to account for all data) (ibid, p. 57-58) and (iv) “reliability as interpretative awareness” (evidence of dealing with researcher’s subjectivity throughout the process) (ibid, p. 58-59).

To safeguard “pragmatic validity”, I sought to triangulate what was described by the practitioners with their actions, by combining different forms of observation with interviews and informal interactions (Sandberg, 2005, p. 56). In this way, as far as possible, any differences between what the participants said they did, and what they actually did were noted.

In order to achieve “communicative validity”, I became a partial participant and full observer in order to grasp the local ways of practice and key distinctions before conducting in-depth interviews (ibid, p. 54). Moreover, during the interviews, remaining open to the participants’ accounts and using open-ended questions which were then elaborated by follow-up questions, was an integral aspect of the design.

To take account of all the data and thus establish “transgressive validity”, I actively looked for any contradictions in the collected data. When some were identified, I arranged short follow up sessions with participants in order to clarify what was detected (ibid, p. 57-58).

Lastly, to “institute reliability as interpretative awareness” during my visits, I would attempt to follow a different member of the team and be present at different shifts, so as to become aware of variations in the ways of practice (ibid, p. 58-59). After each visit, I would log my thoughts and feelings on what was observed and said, so as to become aware of how they affected my interpretations. I was able to present my interpretations to participants. During my time at the ATC tower I presented my initial findings at training sessions organized by the management. In addition, after observing a situation I would show my notes to the participants to see if they agreed with my account. The participants acknowledged my interpretation, corrected it when deemed necessary and in many cases, expressed that they had not thought about their work from my perspective.

CHAPTER 5: AIR TRAFFIC CONTROL AND IMPROVISATION AT A EUROPEAN INTERNATIONAL AIRPORT: EMPIRICAL FINDINGS

“No greater evil could befall aviation than a fatal collision between two large transports.”

US Flight Safety Director (Biggs, 1979, p. 23)

“We are not afforded the luxury, when we are presented with a situation, of saying, ‘Give me until tomorrow morning to think about it and after the staff meeting I’ll let you have an answer.’”

Air Traffic Controller (Biggs, 1979, p. 151)

5.1 Introduction

The purpose of this chapter is to present the findings and offer an analysis of the empirical investigation I conducted at the ATC tower of a European international airport. The findings presented relate to instances in which controllers improvised in response to the exigencies of situations. By analysing these situations, this chapter seeks to present a preliminary situated understanding of how agents improvise in response to local circumstances.

To aid the development of this understanding, the chapter is structured as follows: first, I offer basic background information that relate to the everyday activities of air traffic control officers (hereafter, ATCOs). Due to the technical nature of the profession, the background information is supplemented with a detailed glossary. Following this, to remain true to the complexity of lived experience and to facilitate cohesion, I provide interview extracts supplemented with descriptive vignettes of different episodes. The description includes a detailed account of actions, the way in which the actions differed from written descriptions of procedures and the improvisation that was triggered in response to situational exigencies. In most occasions I offer reflections of the participant on their actions. After each description, I analyse the vignettes to theorize about the processes that lead to improvisation in each episode. After outlining the process of how improvisation is experienced, I outline four practices that

controllers use across several instances to enact organizational improvisation. At the end of the chapter, I offer a synopsis of the key findings across the episodes. The originality and contributions of the findings are discussed in the next chapter.

5.2 Background Information

In this section I will offer some key background information about the ATC team and its equipment. This will be done across three sections: general information, personnel information and layout of the control room. Throughout references will be made to the Glossary where the reader can find additional information.

5.2.1 General Information

The aim of ATC is to achieve “safe, orderly, and expeditious flow of traffic” (D. Smith, 2015, p. 74). To achieve this, air traffic controllers monitor inbound and outbound traffic with the aim of regulating the flow of traffic by providing information and instructions to pilots. In turn this assists pilots to avoid collision between aircraft or vehicles in the controlled airspace areas. As part of aviation, airspace around the world is divided into flight information regions (FIR). Within these regions, information, alerts and instructions are provided to aircraft. The division of airspace is based on international agreements via the International Civil Aviation Organization (an agency of the United Nations) (D. Smith, 2015, Chapter 3). Each FIR may be divided into smaller regions in which ATC is provided. Normally, small control zones are set around airports. The ATC offered in an airport’s region is referred to as aerodrome control. These zones have a set upper level and their aim is to facilitate the transition of planes entering or leaving surrounding controlled airspace during their arrival or departure from the airport. The aerodrome and centre, pre-agree how and where the transfer of control occurs (Nolan, 2011, Chapter 3,5)

As is usual for aerodrome control, the workspace of the team I observed, was on the top floor of the tall circular tower that is often seen at airports – these buildings are referred to as *control towers* and the top floor is referred to as the

control room. As is often the case, the control room was not enclosed by walls, but by UV proof glass. The reason control towers are so tall (in my case the tower had a height of approximately 36 metres) and that ATCOs work in the windowed control room, is so they can have a high level of visibility of incoming or outbound airport traffic. The control tower I studied handled approximately 200 flights a day during the winter and around 300 during the summer. The area of responsibility of the control tower covered approximately a 40 mile radius around the airport and up to an altitude of approximately 9.000 feet (Nolan, 2011, p. 237).

5.2.2 Personnel Information

The aerodrome's main ATC team is constituted by two basic job roles. *Air traffic control officers* (ATCOs) and *air traffic control assistants* (ATCAs). ATCOs are responsible for ensuring the safe, efficient and organised flow of air traffic (Nolan, 2011; D. Smith, 2015). To fulfil their responsibilities, controllers guide inbound and outbound aircraft via airways (see 3 in Glossary) by applying a set of technical rules. Pilots must always follow the controller's instructions. Pilots cannot initiate or alter their course without approval from the controllers (see 30 in Glossary). To reduce miscommunication, each time a controller issues an instruction, the pilot is obligated to repeat it to the controller ('readback' - see 36 and 39 in Glossary). Communication between pilots and controllers is achieved by using specific radio frequencies (see 10 in Glossary). Whatever is said over the frequency is recorded and can be used in any subsequent investigation. Radar images are also saved at all times (see 14 in Glossary). So although, controllers oversee the navigation of aircraft, they are always accountable for any violation of the rules and can be reported if a pilot feels they have made a mistake.

ATCOs are expected to interchangeably fulfil two positions: (a) tower/approach control and (b) ground control. Tower/approach controllers monitor all aircraft's altitude (see 27 in Glossary), position and speed within their designated airways visually, via radar or by pilots reporting their positions. The aim is to arrange incoming and outgoing aircraft into a safe and orderly flow.

The basic rules that tower/approach controllers abide by when aircraft are in the air, is to keep aircraft separated from other aircraft vertically at 1000ft and approximately 8 miles horizontally (see 26 in Glossary). In addition to the basic rules, controllers must instruct aircraft to remain true to their assigned airway and altitude. Airways are virtual routes in the sky that lead to and from airports. Each airway is made up of a series waypoints (pre-defined coordinates which are named with five letter names - see also 25 in Glossary) and certain predefined altitudes. Sections of airways are also assigned names. Each airway has different direction and altitude constraints to ensure that aircraft are not flying in the opposite direction to the other or close to other obstacles (e.g., terrain, buildings). For aircraft on the runway, Tower/approach controllers are assigned their own frequency to communicate with pilots (Nolan, 2011, p. 239).

The ground controller is primarily responsible for separating aircraft and vehicles taxiing (i.e., moving - see also 20 in Glossary) on the taxiways (i.e., type of road to get to and from runway and vice versa - see also 27 in Glossary), taxi lanes (i.e., type of road to get from a taxiway to designated parking spot which is called a stand - see also 1 in Glossary) while aircraft are taxiing for take-off or to the aprons (sets of stands - see also 2 in Glossary) after landing. Aircraft are not allowed to move without receiving instructions. There are a set of predefined taxi routes which ground controllers can use for directing aircraft to and from the runway. The routes are selected based on which side of the runway the aircraft will land or take off from. The direction for landing or take off is assigned a number [27 or 09 (nickname) in the case of the studied airport] and is activated depending on wind direction (see also 41 in Glossary). Wind direction is important because aircraft must take off or land opposite to the wind direction to avoid any potential dangers. The Ground controllers have their own frequency to communicate with pilots (Nolan, 2011, p. 238).

The role of ATCAs is to assist and support ATCOs in their everyday working tasks. Typically, a large part of their role is to coordinate with other services (e.g., airport operator, FIR, other airports, fire service etc.) on behalf of ATCOs who are nearly always coordinating with the pilots of aircraft. Aside

from coordination, assistants enter data into flight information systems (see 5 in Glossary), inform ATCOs of registered aircraft routes (see 8 in Glossary), prepare the flight progress strips (see 9 in Glossary) and update recorded information for pilots. Only brief and basic training is offered to ATCAs over a period of 2 weeks. Training largely concerns understanding basic terminology and procedures. However, at the control tower I observed, ATCAs do not change posts or jobs easily. Most had at least a decade of experience which is invaluable to helping ATCOs. This is because ATCOs usually move to region control after approximately 5 years of service at the aerodrome, perpetually leaving the aerodrome with relatively inexperienced personnel. Consequently, ATCAs informally train inexperienced ATCOs in the idiosyncrasies of the aerodrome (e.g., how to handle maintenance requests from ground personnel, equipment idiosyncrasies).

5.2.3 Layout of the Control Room

The control room is like an open plan office, but has no dividers. There are 5 work stations on a unified semi-circular office counter that faces the airports runway and taxiways. On both sides of the work stations, all active personnel can have visual access the two aprons of the airport. Four out of five work stations have their own telephone which is controlled by an LED touch screen. Each work station corresponds to a specific job role, position 2 is for the ACTA, position 3 is for the approach/tower controller and position 4 is for the ground controller (see figure 1). As a result, the equipment required for each position is placed near the position that requires them. The two auxiliary work positions (1 and 5) located on the edge of the counter each have a computer with one monitor - they are not always used. At the left of position 1 is the backup radar monitor. Especially position 5 is used in case of emergencies. Personnel on standby come to help their colleagues, by coordinating with other services on their behalf in order to reduce their workload and allow them to concentrate.

Behind the unified workstation is a desk for the shift leader. On the desk, the shift leader has the logbook (key events of the day are recorded) and the

roster (list of personnel and their corresponding shifts). In case of an emergency or high traffic, the shift leader usually takes a seat between positions 3 and 4 to ‘gain the picture’ and offer advice if required. Behind the desk, there are comfortable sofas for staff to take a break between sessions and be on standby in case of an emergency. A floor below the control room one can find the kitchen and the “chill out” room. Staff usually go to rest and have their food in the ‘chill out’ room. On the second floor of the control tower one can find the rooms where ATCOs and ATCAs can sleep when on standby. Figure 2 shows the position of the control room and tower in relation to the airport.

Figure 1- Control Room Layout

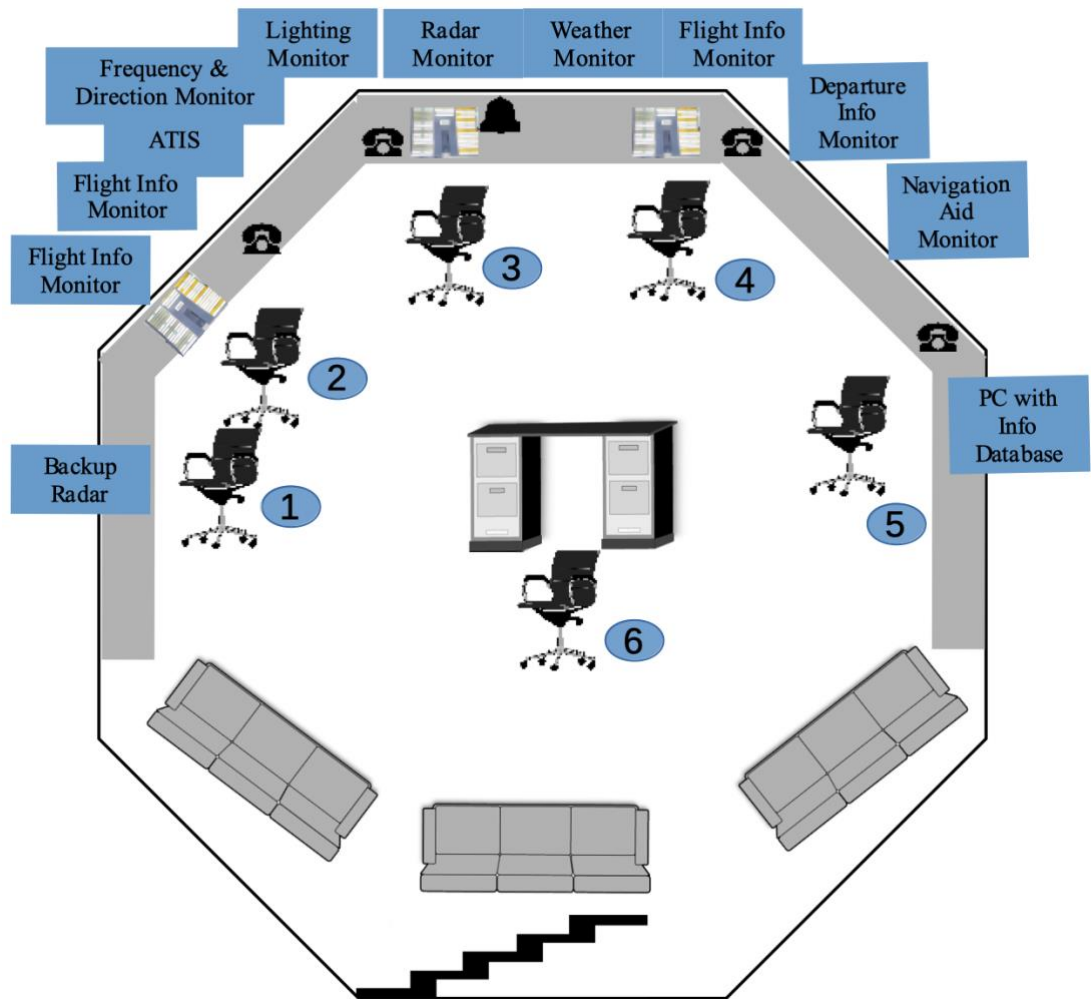


Figure Key:

- | | | |
|----------------------------|-----------------------|-----------------|
| 1 & 5: Auxiliary positions | 3 Approach/Tower ATCO | 6: Shift Leader |
| 2: ATCA | 4 Ground ATCO | |



⁸ Retrieved from: <https://pixabay.com/vectors/analog-communication-icon-phone-1293316/>

⁹ Retrieved from: <https://commons.wikimedia.org/wiki/File:DCP00185.JPG>

¹⁰ Retrieved from: <https://pixabay.com/vectors/bell-silhouette-black-metallic-36258/>

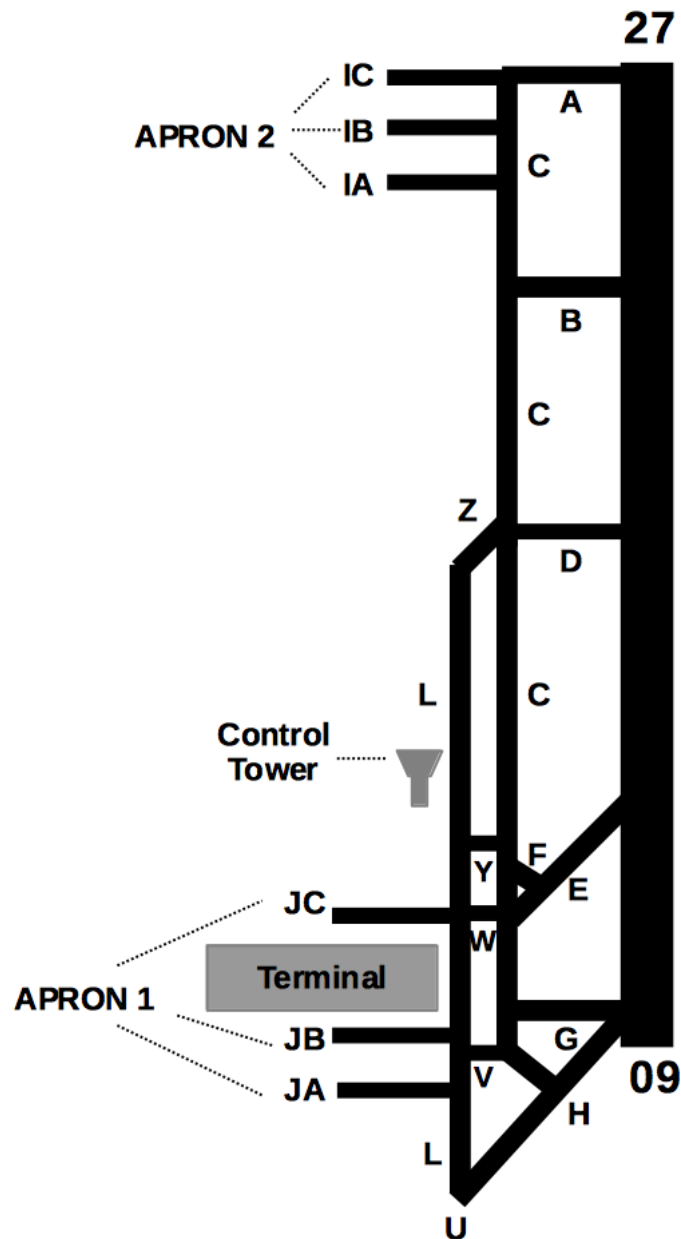
¹¹ Retrieved from: <https://pixabay.com/vectors/sofa-couch-furniture-home-interior-40207/>

¹² Retrieved from: <https://pixabay.com/vectors/business-chair-comfort-office-sit-2028295/>

¹³ Retrieved from: <https://pixabay.com/vectors/stairs-climb-levels-descend-shapes-44070/>

¹⁴ Retrieved from: <https://pixabay.com/vectors/desk-table-drawers-office-154003/>

Figure 2 - Layout of Airport relative to the Control Tower



5.3 Structure of the Findings

The investigated air traffic control unit is a setting in which improvisation¹⁵ in relation is prevalent (for examples see appx. 1). This is

¹⁵ I do not focus on decision making. As argued by various scholars, “decision making” has connotations of detached reasoning which is atypical of everyday action (Hutchins, 1991, 1995; Weick, 1993a). My focus is on situated responses to arising situations in which there is often no time to consciously weigh which decision would be best.

because controllers must continuously improvise in relation to both unexpected and mundane occurrences. I argue that responses to unexpected incidents can be understood as instances of critical improvisation, while responses to mundane occurrences can be understood as mundane improvisation. The latter is the improvisation that is necessary to accomplish normal/routine tasks. Critical improvisation is the improvisation necessary to deal with unusual tasks that have imminent negative consequences.

To understand the extent of critical situations that the unit faces I will present some statistics. In regards to critical incidents, statistics kept by the ATC unit show that in 2017, the year during which I conducted my observations, 7 full emergencies (i.e., danger to aircraft was highly likely), 25 local standbys (i.e., danger to aircraft was likely) and 5 ground incidents (i.e., breakdowns of aircrafts on airport premises) were recorded. In addition to the latter, less critical instances are recorded in the shift's logbook. Such instances include: dysfunctional equipment, bird strikes (i.e., when an aircraft collides with birds), missed approaches (i.e., when an aircraft was not able to land on the first attempt), deviations from standard flight paths due to bad weather and medical emergencies on board (see appx. 1, critical improvisation section).

Beyond recorded critical incidents, improvisation is incessantly enacted as part of mundane tasks (see appx. 1, mundane improvisation section). As part of these tasks, improvisation is unnoticed and thus unrecorded. Like lyrics do not specify how a singer ought to perform a song, likewise organizational routines do not dictate how controllers ought to enact them. Even though occurrences may not be surprising, their singular characteristics constantly call for controllers to creatively adapt procedures to fit their mould (viz., improvise). This is because the combination of differences in air speed, pilot experience, airliner policy, aircraft type, and weather conditions each time create a unique blend of idiosyncrasies that controllers need to cope with (more about this below).

To assist theorizing, in addition to drawing on interview extracts, I mainly draw on three episodes, which are described and analysed across five

sections. Episode 1 is a description of how a mid-air collision was averted (it should be noted that this episode is gradually built up across the sections of this chapter). This episode was selected for two reasons: (i) it presented both unreflective action and reflective action in relation to all three types of breakdowns; (ii) it presented the most severe breakdown and most critical improvisation I had observed. As argued by Sandberg and Tsoukas (2011, p. 344), focusing on breakdowns allows “the relational whole of sociomaterial practice [to be] momentarily brought into view”.

Episode 2 is a description of how a trainee and an experienced controller react differently to an aircraft’s technical problem. Episode 3 is a description of how an inexperienced controller and their shift leader are able to assist an aircraft with a technical problem to make an emergency landing. The reason these two episodes were selected is because they deal with a similar problem (i.e., aircraft with technical problem), but manifest dissimilarities in the levels of experience of the participants. Specifically, Episode 2 compares the reactions of a complete novice controller (prior to gaining licence) with an experienced controller. Episode 3 focuses on the reactions of an advanced beginner controller (a few months after gaining licence) in collaboration with an experienced controller. The dissimilarities allow an examination of how different levels of experience present different concerns, breakdowns and ways of improvising in relation to the same exigencies.

Dissimilarities are integral to theorizing because they assist in the construction of narrative distinctions. The latter are fundamental for refining the language through which we talk about a phenomenon. The subtler the distinctions drawn, the more nuanced our understanding becomes. Distinctions, however, can only become manifest through the comparison and contrast of resemblances and dissimilarities. This is because, “what can be shown cannot be said” (Wittgenstein, 2010, §4.1212).

In the Practices of Improvisation section, in addition to Episodes 1-3, I also draw on four additional episodes. The purpose of the subsection is to identify what types of improvisation practices controllers enact. The additional

episodes were deemed necessary, because they assist in clearly delineating the uniqueness of each improvisation practice. The identification of improvisation practices permits me to complement the detailed understanding of *how* improvisation is experienced with an understanding of how improvisation is enacted on the basis of lived experience.

The structure of the findings is as follows. First, I outline the four processes, one in each section, of how agents *experience* improvisation in response to the exigencies of situations (both in critical and mundane instances): (i) indwelling and anticipation; (ii) concern; (iii) reflection in response to breakdowns; (iv) appraisal, solicitations and circumspection. All four sections feature Episodes 1-3 to show how they each manifest the identified processes. It should be noted that Episodes 1 and 3, unlike Episode 2, are gradually narrated in part across the four sections. Second, in the fifth (v) section (i.e., Practices of Improvisation), I outline how improvisation is *enacted* through practices. In addition to Episodes 1-3, it features four additional episodes.

5.4 Indwelling and Anticipation

This section is structured as follows. First, it illustrates how anticipation emerges through indwelling. For this I draw on some observations and interviews. Second, it illustrates how anticipation and indwelling are related to mundane improvisation. The illustration draws on part 1 of Episode 1. Finally, I illustrate how anticipation and indwelling are related to critical improvisation by drawing on Episodes 2 and 3.

5.4.1 Relating Anticipation and Indwelling

When fully trained, controllers see encountered situations in what Wittgenstein (1986, §129) calls ‘aspect seeing’ – that is, they spontaneously see situations as meaning something (or in Haugeland’s terms as a specific “sort”). However, when controllers are novices they are like anyone else who is not an ATCO, they are ‘aspect-blind’ – they cannot see what a situation means (Monk, 1990, p. 532). With time, however, though nothing intrinsic about the situations

changes, by learning to see them differently (i.e., as a controller) changes everything (Monk, 1990, p. 533).

The process begins by controllers learning the rules and/or procedures of their occupation – in other words they engage in learning rules. Rule learning refers to the familiarization with the ‘ideal form’ of procedures, in Feldman’s and Pentland’s terms (2003, p. 101), the “ostensive” part of routines. Once selected for the programme, controllers spend 12 months memorizing all the rules that surround their work and then 9 months applying the rules to simulations. It will be shown that learning rules does not fully prepare controllers for real, nor even simulated situations.

In this section I will try to illustrate the transformation in perception (i.e., beginning to see from an aspect) by presenting and discussing extracts from interviews with the controllers. The main thrust of my argument is that experience serves as a dwelling from which to see situations because controller’s learn what to anticipate. The anticipation of what is to come changes the prism from which controllers perceive situations. By extension, I argue that due to the incompleteness of the rules, their application to mundane activities is a form of mundane improvisation.

Below I display written descriptions of some procedures (i.e., the rules) that trainee ATCOs have to learn (see Table 7). In the first column I display typical arrival procedures (as displayed in the unit’s manual, albeit with changes to names) used for aircrafts arriving from the north and east of the runway, when runway 27 is active. In the second column, I display the phraseology that is supposed to accompany the enactment of these arrival procedures. The last column outlines the sequence of waypoints aircrafts should be instructed to follow to arrive at the airport and the minimum altitudes at each waypoint.

TABLE 7
Arrival Procedures

Procedure Name	Routing	Minimum altitudes
NORTHERN	ARRIVE TO INDIA THEN TO JULIET TO KILO TO LIMA AND THEN TO AIRPORT VOR	INDIA: FL 130 OR ABOVE JULIET: 9000 FT OR ABOVE KILO: 6000FT OR ABOVE LIMA: 5000FT OR ABOVE AIRPORT: 4000FT OR ABOVE
EASTERN	ARRIVE TO MINT THEN TO NOVA AND THEN TO OSCAR	MINT: 4000FT OR ABOVE NOVA: 4000FT OR ABOVE OSCAR: 4000FT OR ABOVE

Below, Table 8 illustrates the three phases of arrival procedures and the terminology the controllers ought to use at each phase. Specifically, when aircrafts begin a procedure the tower controller is supposed to issue ‘arrival clearance’ (see Table 8, A). While the aircraft is following the procedure the controller has to guide the aircraft to descend in accordance to the minimum altitudes in the above table (see Table, 8 A and Table, 7, minimum altitudes). When the aircraft is close to the airport, the tower controller is supposed to clear the aircraft to approach the runway with the use of instrument procedure or visual approach (see Table 8 B1 and B2). Finally, when approximately 4 miles from the runway and no aircraft is on the latter, the tower controller is supposed to give clearance to land (Table 8, C). The meaning of technical terms can be found in the glossary.

TABLE 8
Phraseology for Each Phase of Arrival Procedure

A. Arriving aircraft clearance
“[call sign] cleared to [pre-specified waypoint], descend via [name of arrival procedure] to altitude [pre-specified altitude] QNH [XXXX] no delay expected [instrument approach name] runway [number] ATIS [any relevant information]”
<i>a. Altitude/level changes</i>
Decrease: “[call sign] descend to [desired level/altitude]”.
Stop descent: “[call sign] stop descent at [desired level/altitude]”.
B1. Instrument Approach Clearance
“[call sign] cleared ILS/VOR [name] Runway [name]”.
(or) B2. Visual Approach Clearance
<i>Before authorising a plane to land visually, the pilot must confirm that they see the airfield: “[call sign] report the (air)field in sight”.</i>
<i>After receiving confirmation:</i>
“[call sign] cleared visual approach Runway [name]”.
C. Landing Clearance
“[call sign] runway [number] cleared to land [wind direction and speed].

From the above, it is obvious that the rules are abstract. As a result, they do not prescribe exactly what to do when aircrafts are arriving. Specifically, they do not prescribe exactly at which point the controller ought to alter altitude, nor how to listen to pilots and take notes while issuing instructions, neither how to time their calls – these are especially pertinent when controlling multiple aircrafts from different directions. Martina explains that it was “very hard to learn to think like a controller. I tried to use a formulaic approach...I tried to learn the procedures by heart and remember that when aircraft get to point A they have to do X and so on, and that I had to say this and that to get the pilots to do X. But it didn’t work, I had to become adaptive because the aircraft never arrived the way I thought they would...So my formulaic approach was doomed...controlling is not something that I learnt by heart, to learn I had to become adaptive.”

Cecilia, a senior training officer explains, “trainees are like babies, they don’t know where to focus, how to talk or how to behave because they can’t

see the picture - how one thing implies another.” Max remembers that “I simply couldn’t keep up with understanding what pilots were saying, then writing what the pilots said and responding. I felt like I was constantly playing catch up and always trying to think what to do next.” Constance reflects that during the early sessions “although we had spent 12 months learning theory, I didn’t know anything. I didn’t know when or how to talk to the pilots, the phraseology. I had to keep looking at the manual to find what I had to say next. I was at my wits end just to figure out what and when to say something”. Similarly, Anthony remembers “In the beginning, it’s like being constantly lost. I just had two planes and faced difficulties just talking to them. I kept questioning myself, even for simple things like talking to the pilot. How did I say it? Did I say that correctly? How was I supposed to say it? Was I supposed to say that now? And then I had to keep going back to the manual to see if I was correct”.

The reflections of Max, Constance and Anthony are typical of novices (see Dreyfus & Dreyfus, 2005). They illustrate how the lack of familiarity with their tools (including phraseology, procedures, strips to track aircraft movement) made them very slow to respond to situations. Max mentions he felt like he was “playing catch up”. Their slowness was tied to consciously reflecting on how they should respond - Constance and Anthony looked at the book to figure out what to say and Max had to think about how to respond. Anthony aptly remarks that due to not knowing how to respond, he kept feeling “lost”. This suggests that the controllers were not able to spontaneously see what situations implied, because they could not sort them into a specific category (Haugeland, 2013, p.6). In the trainer’s words, they could not “see the picture - how one thing implies another”. To use specific tools (e.g., phraseology, procedures) not only requires familiarity with how to use them, but also when it is appropriate to use them. That is, to categorise a situation into a sort and in turn choose tool that has the assigned role of addressing its implications. All three controllers suggest that they could neither identify the appropriate tool, nor use tools when selected.

Leonard remembers that “during theory training, the challenge was to memorize a hell of a lot of legal paragraphs, whole sets of rules and different kinds of information”. Similarly, Anthony said “we used to learn rules and more rules. In a sense our job is all about rules, but back then even though we memorized all of them we didn’t realize what they meant – we didn’t have the experience. I only realized what the rules meant when I started working, I mean it’s good to know them, but they are only guidelines. It’s one thing when everything is neat and tidy in theory and another when things are messy in reality”.

This was illustrated clearly when the controllers moved on to simulation training. There they realized that “everything we had learned was knocked out of the park” (Leonard), because “the nature of the job had changed completely, there were no similarities at all. Of course you could try to apply the rules, but it’s not that simple” (Anthony). The reason for this is that even though one could memorize the procedures in abstracto, it is another thing to apply them in concreto. On paper procedures specify that when an aircraft is arriving from a specific direction the controller ought to initiate the procedure for that heading. Along the trajectory of the procedure, small points specify the minimum altitude at which aircraft ought to fly for their approach (see Table 8). The procedures also dictate the exact words the controller ought to use at each junction of the procedure (see Table 8). But when a situation happens in reality – the written procedures are inherently vague – they do not dictate exactly when or how to enact them, especially when a controller is dealing with several aircrafts at the same time. To paraphrase Schatzki (1997, p. 299), understanding is not a formulation - simply knowing how to apply rules. In phenomenological terms, it’s about being perceptive and responsive to the singularities of situations (Dreyfus & Dreyfus, 2005; Ribeiro, 2014).

To illustrate the difference between blindly following rules and actual mundane work consider the following memories Leonard describes. The first memory illustrates that knowing the procedures alone does not suffice to appropriate time responses to situations. “During my first simulator sessions I

learned that the point is not only to allow aircraft to land safely. For example, I had two departures and three arrivals. I wanted to be safe, so I told the departures to hold short [i.e., wait just beyond the runway] of the runway until the three arrivals landed. But our trainer wasn't happy with me. She would push us, to see that we had to be expeditious. At first it is difficult to imagine that you shouldn't always wait for all aircrafts land before you allow your departures to leave. This is a sort of mentality and you need to internalize. You always to be one step ahead, issue a restriction [for the arrival, in order to allow the departure to take off with no conflict] and let the others go." This memory illustrates that competence requires something more than accordance with rules. Leonard had followed the rules, but his trainer was not happy. This shows that to appropriately time responses, the controller has to anticipate (viz., "be one step ahead") where the movement of the aircrafts is leading up to, in order to allow aircrafts to move without delay.

Another of Leonard's memories illustrates that rules do not show where a controller should focus on and which aircraft to prioritise. "For example, I asked an aircraft to 'line up and wait' [enter the runway but not take off until permission is given], while there was an arrival that had just landed and I was waiting for them to vacate [exit the runway, so the 'lined up' aircraft can take off]. At the same time, I had another aircraft on a 5 mile final [5 miles from the runway] and then I also had another aircraft that talked to me for the first time. This is an instance where I learned that it is not important to answer the latter's call. I had to internalize this; now of course this is second nature for me, I won't go on to answer that person's call. This sort of filtering is not something you can do when you are just starting. You don't know that your focus has to be on your hot zones, I mean the runway and circuits and not on an aircraft that is 40 miles from the airport. I am not sure we even saw the hot zones as hot zones. As a trainee you think that whoever talks to you, you have to answer...but that's not the case." This memory again suggests that to respond appropriately the controller must realize where the 'hot zone' is located, by anticipating where it is more urgent to respond to.

Situations do not come with a priori rules, nor labels with which to arrange circumstances into specific sorts and then choose the designated response to deal with them (Tsoukas, 2018a, p. 9). Prior to this point in their recollections, controllers had spent six months memorising rules, procedures and phraseology. However, they had no practical experience - their experience was abstract. Even though they mention that when in doubt, they referred to their manuals which contained all rules, phraseology and procedures, they still were not sure if they were getting their performance right. As scholars have aptly remarked, humans are not blind rule followers - they do not categorise a circumstance into a sort by following a rule (Tsoukas, 2011a, p. 457). An agent needs the critical ability to judge when a categorization rule is relevant in order to apply it (Ryle, 1949, p. 30; Taylor, 1993, p. 57). This is because “no course of action could be determined by a rule, because every course of action can be made out to accord with the rule...if everything can be made out to accord with the rule, then it can also be made out to conflict with it” (Wittgenstein, 1986, §201). To determine the use of a categorization rule requires dwelling in an experiential background against which to discriminate its relevance.

Without experience or familiarity of using tools, they were unable to see which category of situation they were dealing with and by extension anticipate their implications (Tsoukas, 1996, p. 20; Tsoukas & Cummings, 1997, p. 668). Without seeing the implications, they were unable to judge neither which tool was relevant to the situation, nor when it was relevant to use it (Haugeland, 2013, p. 6). They attempted to use formulaic reasoning, kept questioning themselves, did not identify appropriate courses of action and checked their manuals. This in turn, highlights a diminished ability to *anticipate* how to respond (see Dreyfus & Dreyfus, 2005). Therefore, as illustrated in the beginning of this section by the accounts of the novice ATCOs, having little experience to dwell in signifies a reduced ability to use tools and to anticipate when to use them, because controllers cannot “bridge the gap left open” in situations (Polanyi, 1961, p. 465).

5.4.2 Indwelling and Anticipation as the basis of Mundane Improvisation.

Dwelling in experience allows agents to grasp the implications of the current situation, against the background of past experience and by extension foresee the implications of its meaning (Polanyi, 1962a, p. 19; Rietveld, 2012b, p. 124). Indwelling is enacted on the basis of the *from-to* structure of tacit knowledge. The latter permits agents to attend from deeply familiar aspects, to the meaning of their amalgamation. Thus, experienced controllers can spontaneously “speculate on the possibilities offered by the field of experience”...to fill “the gaps left open in a situation...to vaguely anticipate” a solution (Polanyi, 1961, p. 465). Experience serves as a background against which figures are presented. In fact, the way in which they respond *is never exactly the same as the rules/procedures dictate*. By constantly judging the correct time at which an aircraft ought to enact a specific part of the procedure, the controller slightly deviates from the rule/procedure.

The following episode sharply contrasts reflections of the novices discussed above. This episode was chosen to show that experienced controllers no longer need to think about how to respond, controllers are always in the process of improvisation, and that they are able to cope with situations through anticipation. I contend that routine coping with situations can be understood in terms of *mundane improvisation*. That is, even ordinary situations call for creative adjustment of the procedures to fit with the situations at hand.

Episode 1, Part 1: “Guardian Angel” – Mundane Improvisation. It was a moderately busy session for Angelo. He was fulfilling the role of the tower controller position. At the time of the episode, he was controlling five inbound aircraft¹⁶. Procedures dictate that aircraft are separated by 1000ft vertically and at least 5 miles laterally¹⁷. The aircraft were arriving from two directions, from the northwest and the south. Each direction of arrival, has specific procedures

¹⁶ A departure was also flying at the time, but did not play a central role in the episode.

¹⁷ Informal separation rule, aerodrome approach procedures allow for less separation as its aim is to sequence aircraft for landing.

(i.e., pre-assigned air routes that lead to the airport's runway). Each procedure states a range of a max and minimum altitude depending on land obstacles limits (e.g., mountain ranges, built up areas) and speed. Although aircraft may be flying in the same direction, they are seldom on the same altitude, and if they are, they must be separated by at least 5 miles. Hence, each time Angelo makes an adjustment to the altitude of one aircraft, there is a domino effect. Angelo must re-arrange the altitudes of the rest of the aircraft.

Aircraft #1, was about to land, its position was about 8 miles from the beginning of the runway and was flying at an altitude of 1500ft. #2 was at an altitude of 3000ft on the base turn for aligning with the runway. Aircraft #3 was also in sequence to land. #3's position was over 10 miles behind #2, and was flying at 5000ft. It should be noted, that based on the position, altitude and velocity of the aircraft at the time, Angelo expected aircraft to follow the predetermined procedure for approaching the runway (see figure 3¹⁸). As #1 was about to land, this suggested that #1 will gradually reduce its altitude. Hence, Angelo cleared #2 to descend to 1500ft, but maintain the necessary lateral separation from #1. As usual, Angelo gives the instruction to #2, before seeing that #1 has descended from 1500ft. This is because, like in other cases by the time #2 descends to 1500ft, #1 will have nearly landed. Due to the standardised flight paths, the controllers expects that there will be no conflict with #1 who will already be descending anyway. #3 is instructed to continue their descent to 4000ft.

¹⁸ Runway clipart retrieved from <https://pixabay.com/vectors/airport-runway-grey-asphalt-travel-36472/> and aircraft clipart retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

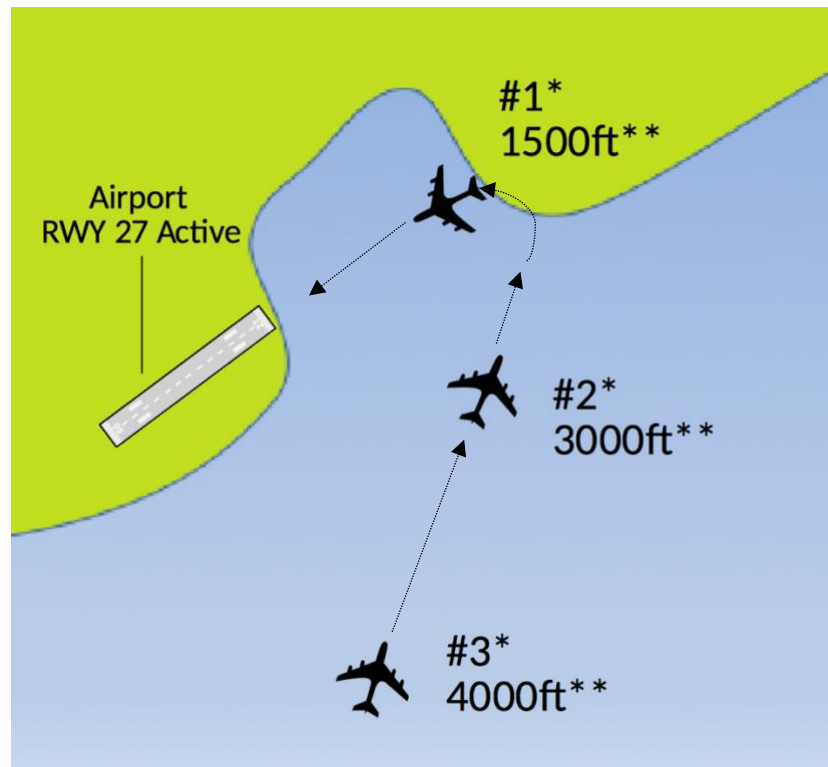


Figure 3 - Positions of Arrivals in Episode 1

Analysis of Episode 1, Part 1: Each time Angelo instructed an aircraft to alter their altitude, he did so prior to the previous aircraft completing his instructions. Especially in the case of #2 and #1, Angelo gives instructions that could bring them on the same altitude. However, this is usual for controllers - Angelo knows that by the time #2 descends, #1 will have descended even further. After a busy, but smooth session of simultaneously handling 19 aircraft in one hour, the second most experienced controller (Calvin) at the tower explained to me: “the key is to be proactive, not reactive, if you don’t issue the appropriate instruction in advance you will fall behind by making more calls”. Thus, as Calvin’s reflection suggests and Angelo’s actions illustrate, competent controllers do not only issue instructions in relation to current occurrences (i.e., current positions of aircraft), but also to *anticipated* future occurrences (i.e., future positions of aircraft).

This signifies that controllers *anticipate* how the aircraft will move. With the anticipation of the movement, Angelo realises the implications of each instruction for the other aircraft. As Cecilia reiterated many times “you have to

be three steps ahead of what is already happening and this ability comes from experience”. Angelo’s experience enables him to prepare for possible eventualities (Benner et al., 1999, p. 64; Hutchins, 2010, p. 431). By attending from his experience (i.e., indwelling), he has a background against which he “can perceive an indeterminate presence of that which [he has] already experienced” (Ribeiro, 2014, p. 579; see also Schatzki, 2006, p. 1868). Angelo can anticipate through dwelling in his past experience of how aircraft move when enacting the pre-specified procedures (see Benner et al., 1999, Chapter 3). In Haugeland’s (2013, p.6) terms, he can spontaneously categorise situations into sorts and by extension respond to them by using the designated/appropriate tool (i.e., procedure and instruction).

Categorization and enacting procedures should not be understood as an intellectual mental process (cf. Healey et al., 2015; Moorman & Miner, 1998b; E. Smith & DeCoster, 2000), but an intuitive response to the anticipated implications of specific circumstances (Shotter, 1996, p. 296; Wittgenstein, 1986, §146-155). Angelo does not have a memory of an identical situation so he can immediately categorize it as the same as what happened in the past - every situation’s specifics are different. As Constance mentioned “each situation is very different, even a small difference in air speed, wind, company or pilots can change things dramatically”. Indeed, Angelo may have had similar past experiences, but since they are never identical it takes a creative leap to “recognize a likeness” (Monk, 1990, p. 511) or put otherwise, to bridge the gap and categorize that this situation is of this sort. Lived experience does not come with labels saying that this situation is of this sort (Tsoukas, 2018a).

Nor do the pre-specified procedures dictate exactly what to do (Ribeiro & Collins, 2007; Tsoukas, 2011a). Written procedures entail a different understanding, like the difference between playing chess and symbolizing chess moves. In Wittgenstein’s words, “the demonstration that I can get there in eight moves consists in my actually getting there in the symbolism...[but] pushing little pieces of wood across a board is something inessential” to symbolizing (Monk, 1990, p. 308). Along the same lines, writing ATC procedures in

abstracto is not the same as performing them in concreto. Performing is open-ended and dynamic, whereas procedures are abstract - they cannot capture the intricacy of situational dynamics. Thus, Angelo “accords” responses with the procedures neither by following rules, nor by being introspective. In his own words, “I can’t explain how I know how to react - I just see what needs to be done and then I just do it”. He bridges the gap by being sensitive to the present in relation to what is anticipated on the background of the past. Put simply Angelo does not rely on abstract knowledge in the form of ‘when X, do Y’; what he relies on is the capacity to perceive a situation as calling for something based on a ‘family resemblance’ to previously experienced situations (Wittgenstein, 1986, §67).

Following from the above, Angelo’s ability to categorize should be understood as a “pre-intellectual” (Shotter, 1996, p. 299) understanding evoked by “the circumstances under which he had such an experience” (Wittgenstein, 1986, §155), which in turn allowed him to spontaneously *improvise a fit between the rules and the situation at hand*. In a conversation with Constance about how she can ‘read’ a situation, “I don’t know how I know - I can just tell...I don’t think about it...it’s a matter of experience, but seeing the picture is something that I wasn’t able to do when I was starting out”. ‘Seeing the picture’ is a common phrase used by controllers (see Owen, 2018, p. 74). It refers to understanding where all airborne aircraft are in each moment and how they are anticipated to move - seeing the present under the prism of experience and future possibilities. Indeed, grasping the picture is so important that an active controller cannot be substituted unless the fresh controller acknowledges that they ‘have the picture’.

Returning to part 1, Angelo categorised the situation, as a situation which called for sequencing the aircraft to land. To assist them he knows that he must gradually reduce their altitude without letting them get too close to each other. Because of being in a similar situation dozens of times per shift (during peak sessions of one hour, an ATCO guides about 12 arrivals), he can spontaneously anticipate not only which procedure or instruction is required,

but also how the aircraft will move. As Tom explained, “I just need to look at the sky or the radar screen and I immediately know where the aircraft is heading and what procedure they ought to follow”. This is why as soon as Angelo adjusts the path of #1 to land, he sequentially reduces #2’s and #3’s altitudes, without waiting for each to complete his instructions. Put simply experience allows him to see where the aircraft will be, and in turn this allows him to spontaneously issue another instruction to the next aircraft based on his anticipation of the future position of the previous aircraft (Dreyfus & Dreyfus, 2005).

Angelo also dwells in the background of a sociomaterial infrastructure (see Lamprou, 2017; Riemer & Johnston, 2014). First as implied above, Angelo dwells in procedures (pre-defined rules and terminology - for further examples see sections B and C in Glossary). For instance, although airway routes are based on the physical airspace, they are virtual - their only ‘material’ traces can be found in maps or navigation systems. By attending from these, Angelo can attend from the position of the aircraft which type of procedure the aircraft must use and in turn anticipate where an aircraft will fly to within the next few minutes (Ribeiro, 2014; Rietveld, 2012b, p. 109; Wrathall, 2000, p. 113). In his own words, “I know where the aircrafts ought to be because of knowing the procedures and seeing how they are used by pilots”.

Second, Angelo dwells in equipment which he interprets in line with normatively established distinctions (for examples see section A, in Glossary). For example, recognising and categorising the positions of aircraft in relation to types of procedures and knowing the pre-specified paths of the procedures are not enough for anticipating the positions of aircraft (see Haugeland, 2013). Live tracking is required. Angelo can ‘see’ and ‘listen’ to the movement of aircraft with the use of the radar monitor and the radio-telecommunication system. As mentioned above, the radar allows Angelo to see the position of the aircraft and thus by recognising which type of procedure is relevant, with the movement of the dot, he can see how aircraft are enacting the procedures. He does not only see dots on a screen. As a controller, the dot is an aircraft which

is flying towards a specific direction, with a certain speed, at a specific altitude as well as the previous trajectory and expected direction (based on current movement). By attending from these features, he can see the position of aircraft and anticipate how they are likely to affect the flight path of the other aircraft. The radio-telecommunication system allows Angelo to triangulate what he observes on the screen, as well as afford a means of communicating with pilots to adapt the flying paths of aircraft based on his anticipations. It should be mentioned, that Angelo and his colleagues have received training on how to track aircraft by only relying on the radio. By asking pilots questions, the controllers can keep track of aircraft positions without looking at the radar.

Following the above, by dwelling in a host of subsidiary aspects (including experience and familiarity with tools) offers an experiential background against which controllers can spontaneously categorise situations into sorts. By categorising situations into sorts, allows them to respond to exigencies, by anticipating which response corresponds to that category. Responses (e.g., instructions) have pre-assigned roles with which a controller uses to address the anticipated implications. The above is clearly illustrated in Mike's reflection on how he has improved over the years: "The difference now is that I am calmer, I immediately know what to do, it's not like when I didn't know what to do - who to call for help, what to use or losing the picture. The more inexperienced you are, the more easily you lose the picture. The difference is that now I know what to aim for, I can even organize the others. My reaction is automatic, it's like BOOM (*claps his hands loudly*) - it's that fast."

5.4.3 Indwelling and Anticipation as the Basis of Critical Improvisation

Above it was argued that controllers necessarily enact mundane improvisation to accomplish routine tasks by anticipating developments through dwelling in experience and their tools (i.e., procedures, phraseology, equipment). The anticipation of developments is tied to how situations matter - their meaning. In the case of inexperience, controllers are not able to see how situations matter. They cannot anticipate developments because they are unfamiliar with their equipment and lack experience of similar situations. The lack of anticipation in

turn does not allow them to fluidly cope with routine air traffic. In contrast, experienced controllers can intuitively respond to the implications of situations by spontaneously seeing their implications.

Anticipation is not only fundamental to coping with mundane situations, but also to coping with critical situations. By drawing on two episodes, it will be argued that different levels of experience infuse situations with different meaning due to seeing the situation from different angles. The different meaning will be argued to be tied to perceiving different implications of the same situation. The perception of different implications is tied to both detecting abnormality and addressing it.

Abnormal situations are critical because severe negative outcomes are imminent. Hence, critical situations is understood as critical improvisation. The latter is defined as creatively preserving the goods of the practice (more about this in the next subsection) by making large deviations from the rules. It should be noted that without anticipating abnormality, controllers cannot respond to it. The two below episodes describe how two pairs of controllers, one of whom is more experienced than the other, anticipate different implications from the same situation. Each episode is followed by analysis and theorizing.

Episode 2 - ‘Smelling’ that something is wrong. It was Tom’s first on the job training session. The session had very low traffic - one aircraft was approaching to land. Throughout the session, Andrew with over 15 years of experience served as a safeguard and a mentor. Tom successfully guided the aircraft to the final stages of the approach procedure. Upon initiating the final stage of the approach, the aircraft can only descend below 3000ft after a certain point, due to an overlap with the missed approach procedure [see 50 in Glossary] at 2000ft¹⁹ (see figure 4²⁰). Tom was very aware of this and asks the pilot to “report passing 3000ft”. The pilot does not answer. Tom asks the pilot

19 The altitude of 2000ft, especially when close to the airport is always reserved in case of an aircraft being unable to land. By having this altitude free ensures that a conflict with another aircraft which is approaching the airport is avoided.

20 Runway clipart retrieved from <https://pixabay.com/vectors/airport-runway-grey-asphalt-travel-36472/> and aircraft clipart retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

again: “report passing 3000ft”. No answer. Tom exclaims with frustration off the radio. Andrew asks Tom to “calm down”. Tom does not give up - he insists for a third time, “report passing 3000ft”. His voice is not calm anymore. He sighs loudly (off the radio, pilot could not hear this). At this point, Andrew suspects that there must be something wrong with the radio. He checks the radio equipment console to see if it is active - all indications suggest that it was in working order. Meanwhile, Tom pays no attention to Andrew. He says, “report passing 3000ft” for a fourth time and then a fifth time - again no response. After a few seconds, the pilot finally responds: “standby”. Tom, unphased by this unusual response, responds: “Roger sir, but report passing 3000ft”. Upon hearing ‘standby’, Andrew knew something was wrong. Andrew told Tom that he was taking over control. Andrew immediately asked the pilot if he needed assistance with something. The pilot said “negative”, but later explained that he was performing checks because the aircraft system presented an indication of a hydraulic problem. The pilot went on to land normally.

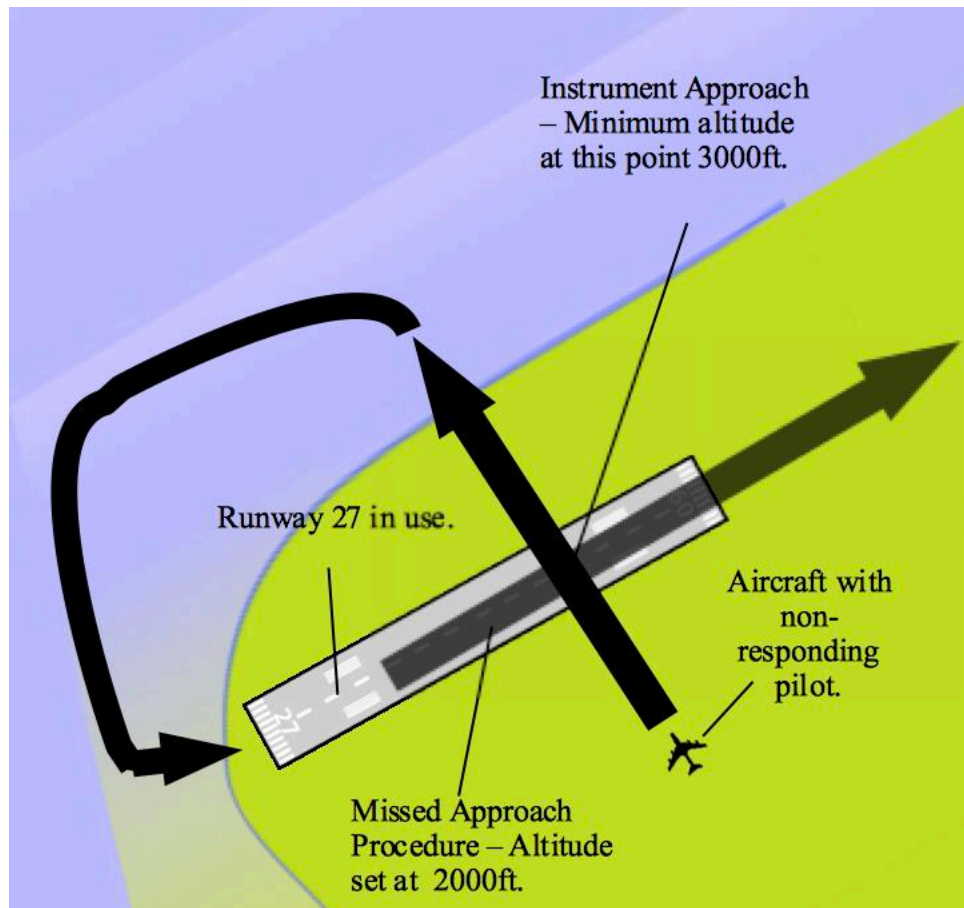


Figure 4 - Position of Non-responsive Pilot and Missed Approach Procedure

Episode 2 Analysis. In the next paragraphs Episode 2, despite several allusions to emotional experience, will be analysed in reference to indwelling and anticipation. Emotional experience in this episode will be addressed in the next section.

Tom is an inexperienced controller. As most novices, his performance is characterised by rigidity – cannot adapt to circumstances (Dreyfus, 2017b; Dreyfus & Dreyfus, 1986a, 2005). This is because he is pre-occupied with getting his performance correct by paying attention to rules. In his own words: “I was mainly concerned with getting the readback [see 36 and 39 in Glossary] to tick all the boxes so the procedure continued...I was more concerned with Andrew telling me that I got everything right, all the required information, the readback, the flight levels.” The reason Tom insists for a readback is threefold: first, Tom is pre-occupied with the rule that states that the pilot must read back

every instruction issued. Second, by focusing on getting the procedure correct, Tom wanted the readback to move on safely to the next step of the procedure. Third, by not completing the first two, Tom thought his performance would not merit praise from Andrew. This suggests that Tom saw the meaning of the situation as a test of his ability to perform, not as an abnormality. In his own words: “I knew I was making more calls than an experienced controller, and I thought that the pilot was fed up with me. This frustrated me, but I didn’t think there was anything wrong.”

In contrast, Andrew saw the meaning of the situation very differently. After the third call, unlike Tom, Andrew was not concerned with the rules (viz. the pilot giving a readback). Andrew later explained - “I was worried because I knew there was something wrong, first I checked that our radio was working. After I saw that was ok, I suspected that either the pilot’s radio wasn’t working or the pilot was pre-occupied with something. As soon as he said standby I knew that something was wrong. He wasn’t responding because he was pre-occupied”. Like most experts, he is flexible to the circumstances (Dreyfus & Dreyfus, 2005). After Tom’s third call, to Andrew it was obvious that the situation was abnormal. Consequently, Andrew and Tom paid attention to different aspects the situation. Andrew initially checks to see if there is something wrong with the radio-telecommunication equipment. Later, upon hearing the pilot say standby, Andrew was sure that the situation was abnormal and he immediately takes over to offer help. Both latter aspects were peripheral to Tom who instead insisted on formalities.

Following the above, although both controllers faced exactly the same situation, a different meaning was presented to each. To Andrew it presented itself under the category of abnormality. To Tom it presented itself under the category of a non-cooperative pilot which made it appear frustrating. A key difference between the two construal’s was that by categorizing the situation differently, controllers anticipated different implications. Tom thought that the reason the pilot was not responding to him was because the pilot was tired of Tom’s excessive calls. Furthermore, he anticipated that this would affect

Andrew's appraisal of his performance. Both implications frustrated Tom. As this was Tom's first on the job training session, he had little experience to dwell in (Polanyi, 1958). As part of simulator training, emphasis is placed on assessing the trainees ability to use phraseology, to track and guide aircraft. Therefore, he had no similar experience *to attend from*, to categorise this situation as abnormal (Polanyi, 1965). Dwelling in experience infuses situations with meaning, because past-experience serves as a tacit background for current-experience to stand out against as a specific sort (Dreyfus, 1993, p. 31; Polanyi, 1961, p. 468, 1962a, p. 14; Rietveld, 2012b, p. 124).

Tom related the situation to his experiential background of assessment and performance. This is the reason Tom insisted on getting the readback. In contrast, Andrew filled in the gaps left in the situation differently. By dwelling in a different experiential background where he had seen similar situations before, a different categorization allowed him to anticipate different implications (Polanyi, 1961, p. 465). In particular, by dwelling in his experience he anticipated "the indeterminate presence" of equipment failure, or something preoccupying the pilot (Ribeiro, 2014, p. 579; see also Schatzki, 2006, p. 1868). This is the reason he checks the radio and upon hearing "standby" asks if the pilot needs assistance.

Talking to Tom a few months after the incident, he reflects on it and felt embarrassed. "I just wasn't ready to see it at the time. Now I know I was unprofessional, but I thought the pilot was fed up with me. If that happened now I would realise something was wrong because I've dealt with many incidents since then. *Now I can smell trouble without being told*. If a pilot doesn't reply I become suspicious that I cannot be heard, or a slight change in a pilot's voice can tell me that he is stressed...if the pilot is abrupt, tells me that he is doing something else". Tom suggests that his experience allows him to anticipate the implications of similar situations very differently from his first training session. He has learned to categorize situations in which pilots do not respond or respond with a different tone of voice, as an abnormal situation which entails technical difficulties (see Haugeland, 2013). He no longer has to be explicitly told that a

pilot is facing a problem, he can “smell” or see “the indeterminate presence of that which has already experienced” and hence is able to anticipate issues he was unable to before (Ribeiro, 2014, p. 579).

Episode 3 “His experience allowed him to see”. During the time of this episode Norman (an ATCO) had approximately four months of experience. As Aircraft #11 was approaching the airport to land, its pilots had reported a mechanical issue. Specifically, the co-pilot informed Norman that their flaps were not operational. This suggests that the aircraft cannot effectively reduce speed upon landing. As per the procedures aircraft #11 eventually requests to enter the hold (see 49 in Glossary) over waypoint Bravo (see 25 in Glossary). Bravo is located close to the airport, but is positioned in a way that does not affect arrivals or departures. With a slightly shaken voice, Norman clears the aircraft to go to Bravo. This gives time and space for pilots to perform checks. Upon hearing this report, the shift leader (Paul) sits next to Norman to offer support. Paul is a very experienced controller with over 15 years of experience. Despite performing a series of checks, #11’s pilots could not find a solution to the problem and requested a high-speed approach. At the time three aircraft were approaching to land and two aircraft were waiting for take-off. Norman cleared the first arrival (#12) to land and instructed the others that were further away to enter holds. However, for Norman the departing aircraft remained in the background. Paul aware of the departing aircraft advises Norman to allow them to depart after #12.

After the situation was concluded I asked both about this occasion. Norman explained that “because of the emergency I wasn’t sure what #11 would do, so I decided to allow #12 to land first and then rest of the airborne aircrafts to enter the holds. This way I would win some time to see what happened next. Paul saw, *his experience allowed him to see* that we also had departures and suggested that I allow them to leave in order not to delay them”. Paul explained that: “In high speed landings there is a possibility that the runway’s tarmac will be damaged. I’ve seen it before, when performing high speed landings because of the flaps not working, pilots tend to approach the

runway with the nose of the aircraft raised higher than usual. They do so because this increases the surface of the aircraft and allows them to slow down. After the rear tires touch the ground, the front tires hit the ground (*claps his hands emphatically*) with greater force because it is raised higher than usual. This why the tarmac could be damaged and could result in closing the airport for a while. Departures would be stuck on the ground for hours. So, I advised Norman to let the departures to take-off.”

Analysis of Episode 3: Norman offers #11 a priority landing because of the abnormality of the situation, while anticipating the movement of all airborne aircraft. He knows that without allowing the first to land and delaying the others, #11’s priority landing would be jeopardised. Norman’s actions and Paul’s acceptance of offering a priority landing suggest that both controllers categorize the situation as an abnormality (see Haugeland, 2013, p.6). However, beyond the priority landing, they are solicited to different courses of action. This is because they anticipate different implications from the anticipated priority landing. Specifically, Norman is drawn to addressing the aircraft in the air in response to anticipating what is needed to achieve the priority landing. Contrarily, Paul is also drawn to the aircraft on the ground because of anticipating implications after the landing.

Norman’s and Paul’s different anticipations about the implications of the priority landing can be attributed to dwelling in a different experiential background. Dwelling in different experiential backgrounds, foregrounded different figures (Benner et al., 1999, p. 75; Ribeiro, 2014, p. 562). Specifically, because of “seeing it before”, Paul anticipated that #11 could potentially damage the tarmac of the runway by landing at high speed. This then would delay take-offs and landings. In a way, Paul’s past “structured” the present (Schatzki, 2006, p. 1868). Norman on the other hand, lacked this experiential background. He wanted to win some time to see what happened, because he was not sure what to anticipate the implications of a high-speed landing. This is evident when Norman says that “I wasn’t sure what #11 would do”.

Therefore, although both had enough experience for the situation to present itself as abnormal, due to dwelling in different experiential backgrounds, the situation presented Norman and Paul with a different anticipation of implications for the high speed landing which in turn made different responses to appear relevant. Norman is drawn to just clearing the way for #11 to land, because he anticipated a conflict with the other inbound aircraft. Paul is drawn: (a) to clearing the way for #11 to land because of the anticipation of the landing, and (b) allowing the departures to take off because of the anticipation of potential tarmac damage from the high-speed landing.

5.4.4 Summary

Situations present themselves differently to controllers depending on the extent of their experience. Different experiences form different subsidiary particulars in which controllers dwell in. “The past of human activity is not something that no longer exists, that trails off behind the present, just like the future of activity is not something that does not yet exist, that hovers before the present. Past, present, and future occur together” (Schatzki, 2006, p. 1871). Indwelling grounds the past in the present, as a background against which to anticipate future potentialities. In other words, dwelling in experience serves as a background which foregrounds the meaning of present circumstances (i.e., how the implications of situation matter) (Polanyi, 1961, p. 468). The perceived meaning of situations depends on the ability to spontaneously categorise a situation into a specific sort based on similar past experiences (Haugeland, 2013, p. 6). In turn, the categorization permits the anticipation of future implications based on past experience (see Tsoukas & Shepherd, 2004). The anticipation of implications allows controllers to intuitively respond (Ribeiro, 2014, p. 578). Hence, *controllers do not respond strictly to present events, but rather to anticipated events based on present occurrences.*

Anticipation through indwelling, is key to both dealing with normal and abnormal situations. Indeed, without anticipating a situation as a specific type, it is impossible to respond to it. This is because situations do not have an a priori background against which controllers can attend from, in order to foreground

refined perceptual categorization (Polanyi, 1961, pp. 466–467). Unlike art, which in some cases the painter demarks the background of an object (e.g. Cezanne’s ‘Blue vase’ painting), real contexts do not have an a-priori figure/background demarcation (Ribeiro, 2014, p. 568). Therefore, it takes a creative leap to see what a situation entails and how to appropriately cope with it. Mundane situations require mundane improvisation (i.e., small deviations from the rules). Critical situations (i.e., situations that have imminent negative implications) require critical improvisation (i.e., large deviations from the rules). This is because the rules do not prescribe how to cope with the singularities of any situation.

Categorising a situation into a sort is not always enough to see the full extent of implications. Even after categorising a situation as a specific sort, the extent of one’s experiential background of a specific type of situation still plays a key role in anticipating and responding to its full implications. As illustrated in Episode 3, although the situation appeared to both Paul and Norman as abnormal, they anticipated different implications. Norman had never dealt with a high-speed landing before, whereas Paul had. Because of dwelling in different experiential backgrounds, this presented the situation calling for more actions for Paul and less for Norman. Having seen this before, Paul anticipated damage to the runway. Against this background, letting the departures to take-off prior to the emergency landing appeared relevant. Without this background, Norman only saw the relevance of clearing the way for the emergency landing.

5.5 Concern

Above it was argued that dwelling in experience (of similar situations and tool use) enables anticipation. Indwelling allows controllers to have “a large repertoire of background experiences that enable them to see situations with a prepared mind” (Benner et al., 1999, p. 65). In all the above episodes, the anticipated implications evoke responses from the controllers. This suggests that what controllers anticipate is not indifferent to them (Tsoukas, 2018b). Quite the contrary. By reacting to anticipated implications suggests that

controllers are *concerned* about their anticipations (Lambie & Marcel, 2002, p. 229).

Agents do what they do, not because they are stimulus-response automata. They act for the sake of something – because they *care* about their practice's *goods* and *desire* a specific *telos* (Castoriadis, 2005b; MacIntyre, 2007). Situations are experienced as normatively and emotionally charged (Frijda, 2009; Shotter & Tsoukas, 2014a; Solomon, 2004). As the goods of practices are taken for granted, indwelling also entails being *concerned* about how things matter. The practice's goods act as a taken for granted background for how situations “ought” to be (MacIntyre, 2007). Dwelling in the significations of this background, allows the spontaneous interpretation of situations and their implications, as well as a means for motivating reactions. Put simply, controllers react to their anticipations because they are *concerned* about their practice's goods (Dreyfus & Kelly, 2007, p. 53; Frijda, 2009, p. 264, 2010b, p. 573; Lambie & Marcel, 2002, p. 231).

Practices at the control room revolve around two goods. Like most high-reliability organizations, the central good is safety (see Reason, 1995, 2000). *Safety*, refers to minimising the possibility of exposing any aircraft to hazards such as terrain obstacles, weather conditions and other aircraft or vehicles. Its centrality is illustrated by the fact that procedures for aircraft approach or departure are designed in a manner which minimises aircraft exposure to danger. Safety, however, as a target is sought to be achieved in conjunction with *expedition*. Expedition relates to ensuring that aircraft are directed in a way that enables them to travel to their destinations with as little delay or inconvenience as possible (see appx. 2 for additional evidence).

Both the above goods are sought to be achieved on the basis of the *mood of attentive calmness*. That is, controllers experience emotions under the umbrella of the mood of their practice. Attentive calmness is conceptualized as an orientation to remain calm and attentive to exigencies under all circumstances. This is because the “teleological structuring” of practices is coordinated with “emotions and moods that participants should or may enjoy”

(Schatzki, 2002, p. 80). In Heideggerian terms, moods allow agents to encounter entities “by determining how those entities will matter to [them]” (Dreyfus & Wrathall, 2005, p. 5). Mood, thus, is an orientation of engagement with encountered situations - a way of “being tuned in to the things in the world” (ibid, p. 5). Specifically, from early on in their careers ATCOs learn that they must always be polite, feel calm and have a steady, reassuring and confident voice when talking over the radio. Attentive calmness is considered key for helping pilots to remain calm so as to guarantee their cooperation (see appx. 3 for additional evidence). Both the latter are understood to be fundamental for safety and expedition.

Although the two goods and mood are not visible to the naked eye, their presence is manifested in the actions and accounts of participants (Lambie & Marcel, 2002, p. 229). Participants would talk about the goods or mood, and as shall be seen below, would re-enact them on a daily basis thanks to their concern about them (Gehman et al., 2013).

When any of the above (goods and/or mood) are violated, agents act as the “ensorious guardians of the tradition” - they seek to protect the practice’s goods (Haugeland, 2013, p. 13). Hence, the implementation of the three aforementioned goods is scrutinized through *accountability*. Accountability, relates to *conforming* to the rules and values of ATC (see appx. 4 for additional evidence). All controllers are aware that they can be held accountable for all their actions (or inactions) so they always strive to follow all pre-defined rules as closely as possible. This makes them aware that they are responsible for the safety of flights. In this way, the two goods and mood are enmeshed in practice - they are not separate. Under normal circumstances, controllers cannot seek to achieve one good at the expense of the others. All goods are differentially illustrated in the above episodes.

In *Episode 1*, as soon as Angelo issues an instruction to change the altitude of one aircraft, he spontaneously moves to re-arrange the other aircraft’ altitudes. As illustrated above, he issues instructions prior to aircraft completing his previous instructions. This suggests that he anticipates not only the future

position of aircraft, but also the implications of their anticipated position for the safety of the other aircraft. Without issuing instructions in response to his previous instructions there would not be adequate spacing between aircraft. The higher the proximity between aircraft, the more likely it is for aircraft to collide. This suggests that Angelo's constant adjustments seek to avoid risking the safety of the aircraft. Thus, Angelo's concern for aircraft safety, serves as key contextual background which foregrounds the necessity to continuously issue instructions to pre-emptively separate aircraft. As illustrated in Episode 1, there are rules in place which dictate that aircraft must always be separated both laterally and vertically with a set distance. Procedures also dictate a minimum vertical distance from terrain obstacles.

By acting "according to the rules" (Harré, 2002, p. 116), Angelo creates buffer zones between different aircraft and terrain to safeguard against any unexpected deviations. Moreover, Angelo's instructions permit the simultaneous execution of procedures by different pilots. This enables multiple pilots to approach the airport at the same time. Hence, Angelo's instructions not only ensure safety, but also expedition. In parallel, despite having only seconds to issue instructions, Angelo's radio telecommunication is calm and steady. This manifests the requisite mood of attentive calmness required from controllers. Just before a session I asked Angelo how he feels when it's his turn to take over the tower position: "I tend to feel slightly nervous prior to my sessions...although I am confident in my abilities, I'm always concerned with doing everything safely and correctly". In addition to the actions taken in the episode, Angelo's reflection also indicates that preserving his practice's goods, is a matter of concern to him (MacIntyre, 2007; Tsoukas, 2018b). This is why he feels slightly nervous prior to every session.

In *Episode 2*, Tom is concerned with the non-responding pilot. Although the aircraft was bound to land, it could not be allowed to descend below 3000ft at that point due to safety. This is because below the aircraft's position at the time, the altitude of 2000ft was reserved for aircraft that are unable to land. To avoid this possibility, he continuously asks the pilot to confirm passing 3000ft

because Tom is concerned about the implications of descending below that altitude. Thus, Tom insisted on a readback because he knew that he could not move on to the next step of the procedure without safeguarding against the anticipated possibility of a dangerous conflict at 2000ft. As the pilot did not respond to Tom's calls, he became frustrated. Tom's frustration led him to lose his attentive calmness, as illustrated by increasing the volume of his voice.

Ironically, Tom's concern about safeguarding the aircraft, led him to overlook that the pilot was already facing a dangerous situation. Despite his erroneous judgement, and in addition to his responses, Tom's emotions illustrate that he is concerned about his practice's goods. The situation evoked an emotional response because Tom felt that the goods of the practice were jeopardised (MacIntyre, 2007; Tsoukas, 2018b). Tom's emotions about these developments tempered his responses (see Frijda, 2010b; Solomon, 2004), but because he was not in the appropriate mood he behaved inappropriately. Tom initially worried about the aircraft not responding, because he cared about its safety and his performance evaluation. Worry as a form of stress, argues Weick (1990), helps agents focus on the identified source of concern. It underlay Tom's obsession of evoking a readback from the pilot. Tom anticipated that a readback from the pilot would address his concerns about safety and his performance. As the desired response was not offered, Tom became increasingly frustrated. This was indicated by raising his voice. As argued by Solomon (2007), frustration is a type of anger. When experienced it suggests a judgement of being wronged (see also Ekman & Friesen, 2003). Tom felt wronged, because he learned that it is the pilot's duty to give readbacks. This sense of injustice, led Tom to lose his attentive calmness.

Andrew on the other hand, anticipated the additional danger because of his experience. His concern about the implications of the situation on his practice's goods tempered Andrew's reactions. Like in Tom's case, Andrew's emotional response of worriedness allowed him to focus on the anticipated sources of his concern (Weick, 1990). His concern about safety motivated Andrew to initially investigate the functionality of the radio and subsequently

to take over from Tom (Solomon, 2007). Unlike Tom, however, Andrew maintained his attentive calmness and managed the situation appropriately – ensuring safety and expedition. After the incident, Andrew is aware that the radio exchange was recorded. Consequently, Andrew as the shift leader recorded the event in the logbook to align the radio records with the logbook records. This is standard practice; all non-routine situations are registered to be reviewed by the Senior ATCO [superintendent of control tower]. The review, permits the Senior ATCO to investigate whether the situation was responded to appropriately (i.e., in line with the goods and mood). This illustrates the accountability which underlies the actions of controllers.

Similarly, in *Episode 3* Norman is concerned about the safety of the aircraft with the flap issue. This was illustrated both in his emotional responses and subsequent actions (see Gehman et al., 2013; Solomon, 2007). In response, to the pilot's report of a technical error, Norman's voice becomes slightly shaky - this illustrates that Norman was feeling stressed. Moreover, after the incident Norman reluctantly confessed that his "experience tended towards the stressful side". The stress motivates Norman to focus on the identified source of concern (Weick, 1990), while remaining in the appropriate mood. He does not let the stress overcome him, but instead fights to cope with the situation – after his initial responses his voice grows more confident. First, he permits the aircraft to go to waypoint Bravo to perform checks. After the pilot informs Norman that they could not fix the problem and requests a high-speed landing, Norman offers them a priority landing. A priority landing means that the aircraft can skip the aircraft sequence to land as soon as possible. They are only offered to aircraft that face exceptional circumstances. As a safety precaution, the goal of a priority landing is to minimise time spent in the air. To enact the priority landing, the controller must anticipate the future positions of all aircraft in sequence, in order to find a way to allow the distressed aircraft to land quickly. Norman instructs the first aircraft in sequence to land, but also instructs the rest of the arrivals to enter the hold. As explained above, by anticipating the future movement of the aircraft, Norman makes the adjustments to clear the way for

the distressed aircraft. If Norman allowed all aircraft to continue their approach without alterations, they would either obstruct or be obstructed by the priority landing of the distressed aircraft. As this possibility would endanger the safety of all aircraft, Norman seeks to avoid it.

Although safety was a priority, the high-speed landing raised concerns about another good (MacIntyre, 2007; Tsoukas, 2018b) - expedition (i.e., avoiding delay to aircraft movement). Thanks to his experience, first Paul and later Norman became concerned about the potential implications of the high-speed landing. In Paul's words "although I have faced many emergency situations over the years I still felt stressed, because they are never the same, and I think you should feel stressed because it shows you are concerned about the seriousness of the situation... I tried to show Norman that despite his emotions he should be calm and helpful to the pilots". A damaged runway could delay the queue of departures for hours. Paul's suggestion to allow the departures to take off before the distressed aircraft's landing, and Norman's acceptance of the suggestion, signify that expedition was also key concern. The importance of expedition, motivated their reactions. Because the delay of the departures was undesirable, Paul advised Norman to let the departures to take off prior to the priority landing. Then, Norman took Paul's advice in order to avoid potential delays. After the landing, Paul recorded the key features of the incident in the logbook to be reviewed by the SATCO. Again, this signifies the accountability that underlies the reactions of controllers.

5.5.1 Summary

All the above suggest that controllers respond to situations because they are *concerned* about preserving goods of their practice (i.e., safety, expedition). To preserve the goods in an appropriate manner controllers must find a way to remain in the mood of attentive calmness. That is, they should not become overwhelmed by frustration or stress, but instead should preserve attentive to pilots' needs and calm. Failure to preserve the goods or to maintain attentive calmness results in being held accountable. For example, Andrew took over from Tom. While Tom was excused for violating the mood because he was a

trainee, such behaviour on other occasions would be reported and reprimanded. Awareness of accountability is a means that assists the conformance of controllers with the goods of their practice (for further evidence beyond the described episodes, see appx. 4). Concern is manifested both in the emotional experience (see Frijda, 2010b; Solomon, 2004) and reactions of the controllers to the situations (Gehman et al., 2013). Norman is always concerned about “doing things safely and correctly”. Tom, Andrew and Norman felt worried because they were concerned about the safety of the aircraft. Although the controllers’ emotional concerns spontaneously motivate reactions (Frijda, 2010b; Frijda et al., 2014; Rietveld, 2012b), they do not, with the exception of Tom, let them overwhelm them – the mood of attentive calmness predisposes them to keep their emotions in check in a way that still keeps them concerned.

Despite the spontaneity of emotional reactions, the reactions themselves are not random. Controllers’ emotional reactions reflect judgements about whether the unfolding situation is in line with the goods of the Practice (Dreyfus & Kelly, 2007, p. 53). Emotions, through attentive calmness orient controllers to respond to their anticipations in a way that safeguards the goods of their Practice. Angelo keeps adjusting altitudes of the aircraft to maintain safety and expedition. Tom insists on getting a readback because he anticipates that this would safeguard the aircraft. Andrew and Norman offer help to distressed pilots to ensure their safety. Finally, Paul advises Norman to allow aircraft to take off so as not to be delayed. Hence, emotions and mood are manifestations of concern about their practice’s goods that orient reactions to anticipations.

5.6 Reflection in Response to Breakdowns - The Collapse and Restoration of Anticipation

Dwelling in experience permits controllers to anticipate implications of situations. Controllers do not experience the anticipated implications neutrally. As controllers care about the consequences of situations, their implications are interpreted in reference to the goods of their practice. Thus, concerns about anticipated implications serve as a semantic background which spontaneously

motivate responses to address implications in line with the goods of practice. Insofar as situations diverge from what is typically anticipated, they often result in ‘breakdowns’ in agents’ performances (Tsoukas, 2011a), bringing engaged action to a halt. During such breakdowns, through reflection, agents become focally aware of what, during action, they took to be subsidiary elements (i.e., the background), in order to reconsider them, and find a new way to continue their action in congruence with their practice (Tsoukas, 2009a, 2011a). Below, by drawing on Episodes 1 (part 2), 2 and 3 (part 2), I will illustrate in greater detail how agents respond to breakdowns.

Episode 1, Guardian Angel: Part 2, The Collapse and Restoration of Anticipation. As an orderly sequence is put in motion with the three first aircraft, Angelo adjusts the altitudes of aircraft further behind. He instructs #4 to descend to 7000ft. As #4 is reading back Angelo’s instruction, an alarm of the airport’s instrument landing system is clearly audible. The alarm suggests that the system is not broadcasting the required signals to align aircraft with the runway as they land (see 11 in Glossary). For Angelo the alarm remains in the background. In his own words: “I wasn’t sure to which system the buzzer corresponded to. I didn’t pay much attention due to the workload”. So, Angelo, moves on to adjust the next domino piece - aircraft #5. While instructing #5 to descend to 10000ft, the buzzer goes off for a second time. This suggests the instrument landing system is restored, however, again for Angelo this remains peripheral.

Having dealt with all ‘domino pieces’, Angelo had to restart the cycle. Aircraft #1 was getting closer to the runway, so Angelo gave #1 clearance to land. Pilot #1 responded that “unable, we have to do a 3-60, we lost the [landing signal]”. A 3-60 (pronounced three sixty) means that the aircraft will do a 360 degree orbit over its position. The pilot wanted to do this to realign with the runway. This is highly unusual. This is because when pilots cannot land with instruments, according to procedures they have two options: (i) proceed to land visually (see 45 in Glossary) or (ii) use the “go around” procedure (see 50 in Glossary). Angelo only heard the word “unable”. Thus, as per the procedures,

Angelo expected that #1 would use a visual approach instead of the instrument approach. This is clearly seen when Angelo asks #1: “Roger do you have the field in sight?”. #1 responds, “negative, at the moment”.

This surprises Angelo as he cannot understand what is going on. Meanwhile, the aircraft begins its orbit to the left. In Angelo’s own words: “I was surprised, I could see from the window that he was angling a bit to his left, and that he wasn’t gaining altitude. I was saying to myself, what is this guy doing?”. By #1 saying negative, Angelo assumed that it was going to follow the “go around procedure but he didn’t say it which is unusual”. Due to his surprise, he directed his gaze from the radar screen to see outside the window towards the aircraft. He saw the #1 tilting to its left but assumed that it was because of wind instability. However, Angelo could not see the aircraft trying to increase its altitude. This further puzzles Angelo so he tries to confirm that the pilot is going around. #1’s pilot responds: “well, (unclear) do another left turn and come back again”.

With this realisation, Angelo could see something nobody else could notice - he anticipated a mid-air collision between aircraft #1 and #2 (see Figure 5²¹). In his own words: “As soon as I realised what was going on, I panicked. My heartrate rocketed. For a second I thought I was going to lose it, but then it was as if somebody I woke me up with a start. In that instant I said to myself - do something now! DO SOMETHING NOW! They are going to crash! Next thing I know, I did the first thing that came to mind”.

²¹ Runway clipart retrieved from <https://pixabay.com/vectors/airport-runway-grey-asphalt-travel-36472/> and aircraft clipart retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

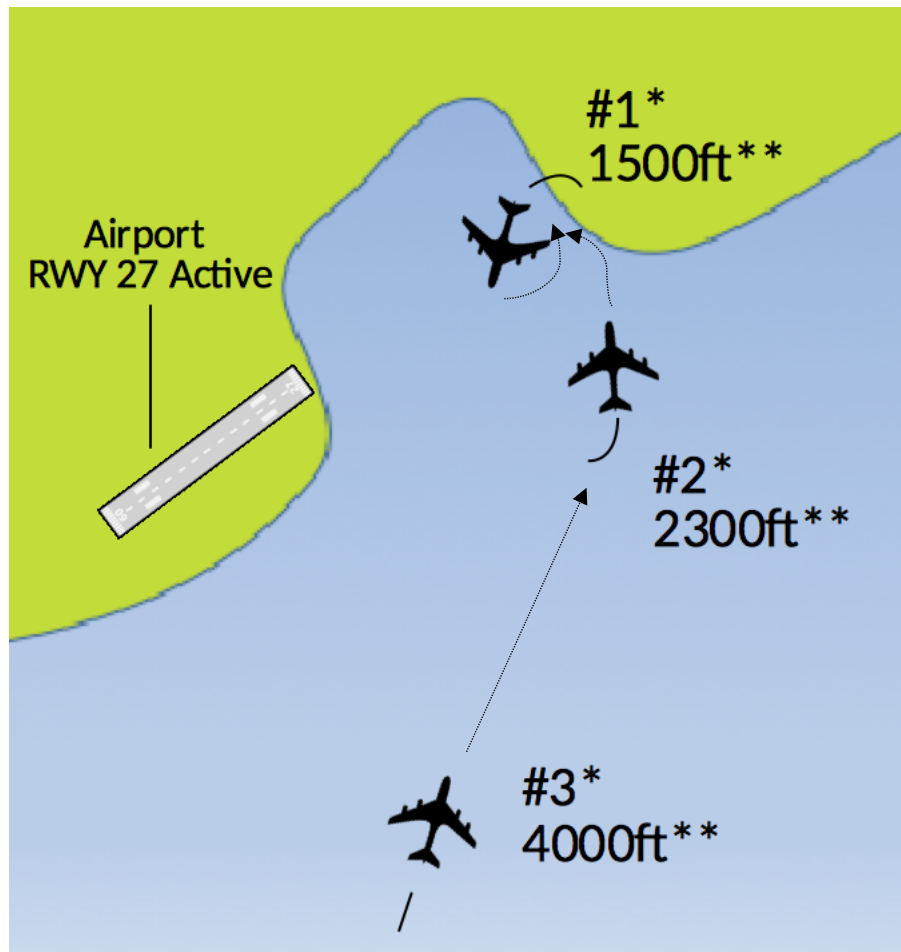


Figure 5 – Positions of #1 and #2 in Episode 1

Analysis of Episode 1 (Part 2): During part 2, Angelo faces three breakdowns. First, he continues sequencing aircraft #4 and #5. While doing so a buzzer is heard in the background. Angelo does not pay attention to it because the buzzer does not address his concern for sequencing. Having allowed #4 and #5 to descend as far as they could, Angelo restarts the cycle of instructions by clearing #1 to land. Hence, Angelo anticipated that #1 would land with the standard instrument approach. However, after issuing the instruction something unanticipated happened. #1's pilot specified that they were "unable" to land and were going to do an orbit over their position to re-align with the runway. Angelo only hears "unable". He does not anticipate an orbit because it is not part of procedures. As Angelo only hears the first part, this is not perceived as a major problem - it was experienced as a minor breakdown - a malfunction [i.e., simple obstruction to current coping - entails switching to next most likely alternative

way of coping with the situation (allowing #1 to land)] (Dreyfus, 1991; Yanow & Tsoukas, 2009, p. 1351). Thus, Angelo momentarily reflects in action to switch to the next most likely way of allowing #1 to land. With the momentary reflection, Angelo anticipates that the pilot would use the visual approach. Thus, Angelo asks the pilot if he is doing a visual approach. Again, the pilot's response defies Angelo's newest anticipation - he says they cannot see the runway. He reflects again. He is aware that if the aircraft was not landing visually, procedures dictate 'a go around' - that they must fly over the runway and follow a pre-defined airway at 2000ft, which will put them again in the sequence to land. "Most pilots perform a go around, at this point so I thought that was what #1 was going to do".

So the lack of visual contact, surprises Angelo and causes a temporary breakdown (Dreyfus, 1991). Unlike before, it is not easy for Angelo to anticipate what the pilot was going to do. This is because in troublesome landings, pilots can switch from an instrument approach, to a visual approach and then a go around. A visual requires visual contact with the runway, whereas the go around requires the pilot to specify the action. As the pilot specified they could not see the runway it meant that they were not performing a visual. In parallel, the pilot did not say "going around". The lack of familiarity with the situation collapses Angelo's anticipation. Angelo does not know how to react, because he does not know what the pilot is going to do (i.e., what sort of situation it is) (Haugeland, 2013). In order to react - he needed to restore his anticipation of how the situation will unfold - to reflect on action (Yanow & Tsoukas, 2009). As anticipation rests on intuitively knowing what sort of situation one is facing, during breakdowns agents have difficulties identifying the situation with a sort. So, they must consciously seek to categorise the situation into a familiar sort.

Without the restoration of anticipation (i.e., re-sorting the situation), Angelo cannot react because he does not know what he is to react to. Thus his performance breaks down - he seeks to investigate the pilot's actions in order to restore his anticipation. To investigate what is going on, Angelo's gaze is

diverted from the radar screen, to the position #1 outside the window. Angelo notices that the pilot is not behaving as someone who is performing the go around procedure, which puzzles him even further. This causes a total breakdown - detached and conscious reflection on the circumstances of the situation (Dreyfus, 1991; Yanow & Tsoukas, 2009). He asks himself what the pilot is doing. So, Angelo continues his reflective investigation by asking the pilot if they are performing a go around. The pilot says they are making a left turn. The restoration of his anticipation scares him. His performance is so disrupted, that he had to reflectively urge himself to respond.

Analysis of Episode 2: Breakdowns were experienced by both Tom and Andrew in Episode 2. Tom initially anticipated that the pilot would respond to each of his instructions. Moreover, at that point in time, obtaining a readback was a key concern for Tom. At 2000ft (1000ft below the pilot's last report), other aircraft could potentially enact a go around procedure (see 50 in Glossary). So, Tom anticipated that without the pilot confirming that the aircraft was maintaining 3000ft would endanger safety. In parallel, Tom knew that he could not move on to the next step of the procedure. This in turn, made Tom concerned about how Andrew would evaluate his performance. The combination of the collapse of his initial anticipation plus his concern about the implications of the lack of readback, motivated Tom to *reflect* on a way to move forward (Dreyfus, 1991; Haugeland, 2013). To move forward, Tom needed to re-establish an anticipation of what the current situation entailed by categorizing it into a sort (Haugeland, 2013). By reflecting in action to deal with this malfunction (switch to next most likely means of coping), Tom realized that he was making more calls compared to experienced controllers (Yanow & Tsoukas, 2009). Based on this reflection, Tom anticipated that the pilot was fed up of responding to his calls. Thus, Tom reacts to the lack of readbacks by insisting on a response.

Similarly, Andrew anticipates that the pilot would respond to Tom. Like for Tom, the lack of responses raised concerns about the safety of the aircraft (Frijda, 2010a; Solomon, 2004). The safety concern, halts Andrew's initial

engagement with the situation as an instructor and prompts Andrew to consciously reflect about what is occurring (Yanow & Tsoukas, 2009). It causes a temporary breakdown while he deliberates on the causes of the situation. To respond, Andrew needs to restore the anticipation of what is occurring. His momentary reflection helped him remember that in similar cases in the past, there was either a problem with the radio-telecommunication system, or that the pilot was pre-occupied with a technical problem. Thus, Andrew's reflection, restores his action readiness by giving him two new anticipations to investigate (Dreyfus, 1993, pp. 34–35). First, Andrew checks to see if the radio-telecommunication system is online. As the radio seemed to work, Andrew eliminated the first possibility and anticipated that the pilot was preoccupied with a problem. Within seconds the pilot says “standby”. This, supported Andrew's second anticipation. So, Andrew takes over from Tom (Andrew knows that Tom has not realized what is happening). Although, Andrew anticipated that the pilot was facing a problem, he was not sure what type of problem it was. To respond, agents require familiarity with situations. Hence, Andrew needed an exact understanding of what the pilot was facing (Dreyfus, 1993, p. 31). Different types of problems require different types of responses (Ribeiro, 2013a, 2014; Taylor, 1993). Therefore, to respond Andrew needed to categorize the situation into a familiar sort (Haugeland, 2013). Sorting infuses the situation with familiarity and allows agents to fill “the gaps left open in a situation...to vaguely anticipate” implications and solutions (Polanyi, 1961, p. 465). Andrew seeks facing a collapse of anticipation tries to reestablish an anticipation of what is occurring through enquiry (see Frijda et al., 2014). He asks the pilot how he could help.

Episode 3, “His experience allowed him to see”, Part 2, Clearing the Way: For the purposes this section, Episode 3's build-up to the high-speed landing will be further detailed. Norman had 5 incoming aircraft and two departures. Aircraft #11 was on the final stretch of the landing procedure at an altitude of 1500ft. Aircraft #12 was allowed to approach the runway from a shortcut visually (see 45 in Glossary). As #11 was about to land, the pilot

informed Norman that they could not extend their flaps. The pilot then asks permission to enter a holding pattern over the airport. When unable to land, procedures dictate that #11 would have to hold over waypoint Bravo, not over the airport. Although, this is unusual Norman permits this (at 3000ft): “If the pilot thinks it is easier for them and it is not interfering with anybody else I have no reason to deny their request, I wouldn’t turn around and say go to Bravo”. Norman cancels #12’s visual approach and instructs them to enter the hold over the airport at 4000ft. Seconds after cancelling 12’s approach, #11 requests to go to Bravo (the designated waypoint for missed approaches. Norman approves the request (see Figure 6²²).

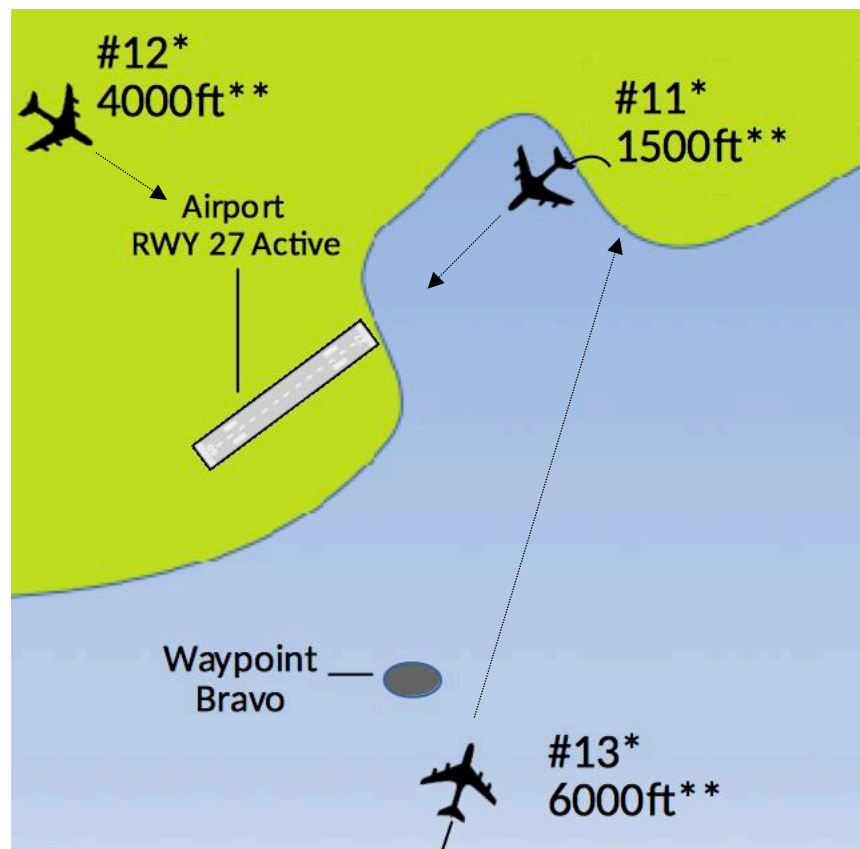


Figure 6 - Positions of Arrivals in Episode 3

²² Runway clipart retrieved from <https://pixabay.com/vectors/airport-runway-grey-asphalt-travel-36472/> and aircraft clipart retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

As the area above the airport would be clear from #11, Norman instructs #12 to continue the instrument approach (see 11 and 34 in Glossary) - not the visual approach (see 45 in Glossary). #11 reaches Bravo and circles above it to perform checks (see figure 7). As #12 is approaching the runway for landing, #13 is quickly catching up. Norman sees this and asks #13's pilot to use a longer approach route. This would delay #13 and in turn would provide the adequate spacing with #12. #13's pilot responds that they are "unable". Norman explains to #13's pilot that "you are very tight with #12". After this Norman asks 13's pilot, "able to make 360 right turn orbit on your position?". The pilot agrees. This allowed #12 and #13 to land (see figure 7²³).

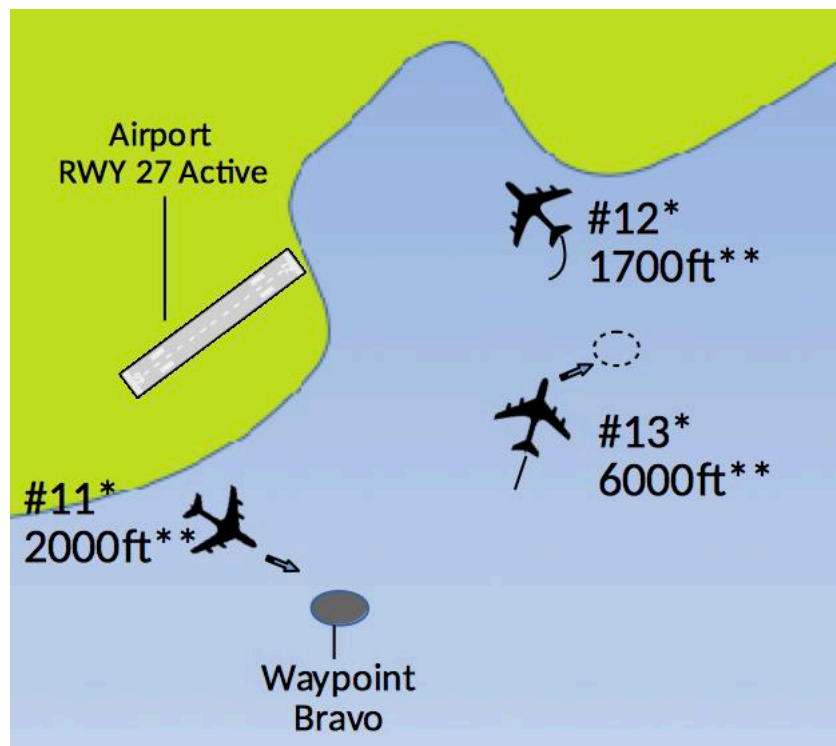


Figure 7 – Improvisations in Episode 3

Analysis of Episode 3 (Part 2). Norman faces four breakdowns of different magnitudes during part 2. Norman is initially taken by surprise when #11

²³ Runway clipart retrieved from <https://pixabay.com/vectors/airport-runway-grey-asphalt-travel-36472/> and aircraft clipart retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

requested to enter the hold above the airport. It is counter to normal procedures which dictate that aircraft should make their way to waypoint Bravo. The request's implications raise safety concerns which prompt Norman to reflect in action about how to respond. In other words, it creates a temporary breakdown, wherein Norman deliberates on how to react (Yanow & Tsoukas, 2009). In Norman's own words: "I didn't know what was going to happen after #11 entered the hold. The detail that worried me, was that #11 and #12 would cross levels and that would set off their collision warning systems". Norman did not know what to anticipate from #11 when in the hold. He was unsure whether #11, which lacked functional flaps, could perform orbits normally. Moreover, he was not sure if #11 would require a priority landing shortly after entering the hold. What he was sure of, was that based on the current flightpaths, without an intervention, the minimum separations between #11 and #12 would be infringed (see 26 in Glossary). In turn, this would trigger the aircraft' collision warning systems (see 22 in Glossary). Norman anticipates two potential consequences. First the trigger would automatically change the altitude of the aircraft (without Norman's instruction or the pilots' intention). This could result in further unanticipated consequences. Second, a full investigation always follows such triggers. Investigators would consider why Norman jeopardised aircraft safety by allowing the minimum separations to be violated. Through reflection he is aware of all the above and in his own words "to avoid any risks I instructed #12 to cancel approach" (*claps hands to show end of story*).

Shortly after cancelling #12's approach, #11 requests to go to waypoint Bravo (designated point). Norman permits this. The change prompts a momentary breakdown (in the form of a malfunction - he switches to the next most likely means of dealing with the situation) as it changed Norman's latest anticipation. #11's movement would clear the path for #12 to approach the runway. With this realisation, Norman instructs #12 that they are clear to approach the runway through the instrument approach (see 34 in Glossary). A few minutes later, Norman notices that #13 was closing the distance from #12. He anticipates that the minimum separation between the two aircraft would be

violated - this causes a malfunction (momentarily shifting his focal object to the next most likely tool that will help him). This anticipation prompts Norman to momentarily reflect on how to react to his concern. In response to the safety concern, Norman asks whether #13 could take a longer route to approach the runway. This would open the distance between the two aircraft. The pilot specifies that they were unable to do so. This then triggers another momentary breakdown - a temporary breakdown (deprived of the normal way of dealing with such an issue, Norman consciously thinks of how to deal with concern). Norman had to switch to a different means of slowing down #13. In response, he instructs #13 to make a 360 orbit over the position. #13's pilot agrees. This allows Norman to address his safety concern.

5.6.1 Summary

When situations unfold in a normal way, controllers tend to respond non-reflectively by anticipating the most likely sequence of the situation. Insofar as situations unfold in unusual manners, the anticipation of controllers collapses (i.e., cannot immediately anticipate how situations are likely to develop). The uncertainty evokes concerns about the goods of the practice. Depending on how unusual a situation is, minor (viz., malfunctions), temporary and total breakdowns interrupt the responses of controllers. During breakdowns controllers consciously reflect in or on the situation (duration depends on the type of breakdown), in order to restore their anticipation about what is likely to follow. Restoring anticipation is necessary for action because one must understand what they are reacting to.

5.7 Appraisal, Solicitations and Circumspection

In this section, I will try to illustrate that the processes (i.e., indwelling, anticipation, concern and reflection) already described above and the two to be illustrated in this section (i.e., appraisal and solicitations) are all interrelated (as circumspection - more about this below) and contribute to how controllers improvise in response to exigencies of situations through relevant affordances. Understanding perception is key to understanding action, as “perception is

geared to action and not to consciously identifying the perceived object” (Frijda, 2009, p. 266). Above, I argued that indwelling enables agents to attend from their experience of similar situations and tool use, to *anticipate un-actualised possibilities* (Benner et al., 1999, Chapter 3; Frijda et al., 2014, p. 6; Hutchins, 2010, p. 431; Ribeiro, 2014, p. 579; Rietveld, 2012b, p. 109; Rietveld & Brouwers, 2017, p. 547; Rietveld & Kiverstein, 2014, p. 348; Wrathall, 2000, p. 113). The anticipation of the implications of situations in relation to concern about their practice’s goods spontaneously infuses situations with meaning and motivates action (Dreyfus, 1993, p. 24; Dreyfus & Kelly, 2007, p. 53; Frijda et al., 2014, p. 3; Rietveld, 2012b, p. 108).

5.7.1 Appraisal and Solicitations

Situations are constantly in the “process of becoming”. Hence, the anticipation of possibilities is subject to the changing dynamics of circumstances (Benner et al., 1999, pp. 10–11; Colombetti, 2010, p. 156; Tsoukas & Chia, 2002). That is, although an agent may seek to remedy a situation in one way, the results of their intervention may bring about other previously un-anticipated possibilities. “The re-evaluation what the task might be is not something that happens every now and then, for instance when a task is finished, but is a continuous (non-reflective) process that puts whatever one is doing right now in perspective” (Rietveld, 2012b, p. 125).

Consequently, after each reaction, controllers need to re-evaluate and re-react based on new anticipations and evoked concerns about their implications. Put simply, agents are “responsive to significance” (Rietveld, 2012b, p. 118). Controllers seek to *avoid/forestall or attain* the implications of their anticipation. To avoid or attain anticipations, relies on appraisal of how situational aspects relate to the goods of their practice. The process of appraising situational aspects and in turn forestalling or attaining anticipated implications, will be illustrated below through Episodes 1 (part 3), 2 and 3 (part 3).

Episode 1, Guardian Angel - Part 3. Prior to his response and after restoring his anticipation, Angelo’s eyebrows are raised and his eyes widen. He

immediately stands up, exclaims with frustration and throws his pen. It should be noted that Angelo does not sit down after the realisation, nor does he note aircraft altitudes as usual on the flight progress strips (see 9 in Glossary). Angelo issues the following instruction: “#2...,eeerm #1 continue on present heading and descend to 1000ft immediately.” The instruction to descend to 1000ft breaks the minimum altitude regulations. As #1 had already started the orbit, the aircraft’s heading was in the opposite direction relative to the runway. As Angelo instructed #1 to maintain its direction, it moved towards the opposite direction and at the same time was descending from 1500ft to 1000ft (see figure 8²⁴). In Angelo’s words this would “steer it clear from the other aircraft...to at least add a bit to their spacing”.

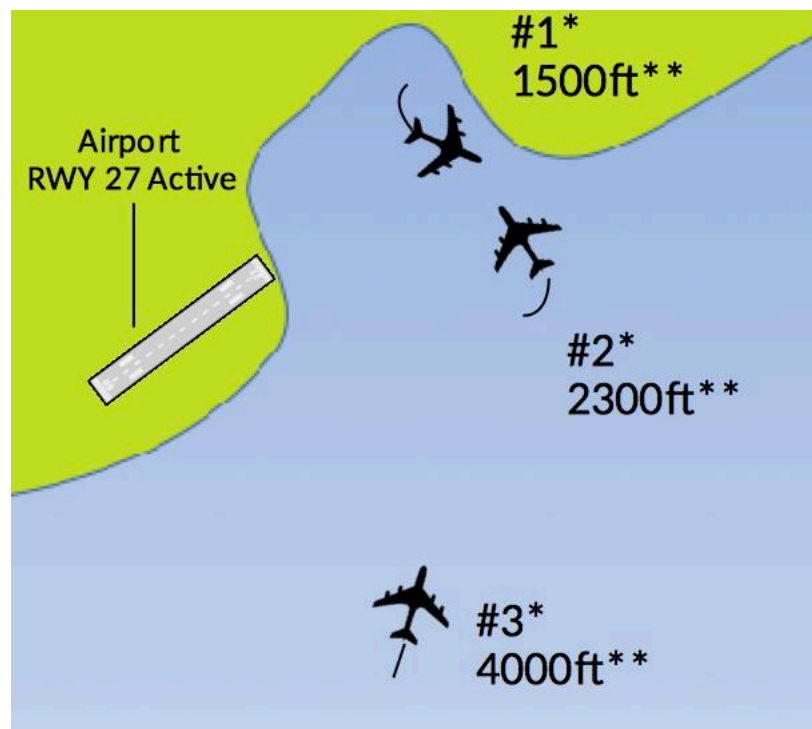


Figure 8 - #1 and #2 on Collision Course in Episode 1

Another 13 seconds go by where Angelo is transfixed looking outside the window. He is still standing, staring at #1 to see if they can dive in time to

²⁴ Runway clipart retrieved from <https://pixabay.com/vectors/airport-runway-grey-asphalt-travel-36472/> and aircraft clipart retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

avoid #2. Number #2 is flying at an altitude of 1800ft - just 300ft above #1 and is still descending. During this time, Angelo notices that #2 has realised what happened, reduced its rate of descent and started to orbit to the right without instruction. Without any verbal communication, Angelo anticipates that the new direction of #2 created another potential collision. Angelo's frustration is evident as he rolls his hands in frustration. Although both aircraft started to move in parallel to each other, the lateral distance between their trajectories was closing fast. To ensure that the collision is averted, Angelo instructs #2 to climb to 3000ft (see figure 9²⁵). In his own words: "my first concern was to separate them with altitude. I had to re-establish the 1000ft vertical separation. With their headings, they would fly in parallel for a while and allow them to gain time so the vertical separation could kick in." However, by directing the aircraft in the opposite direction, was counter to procedures. Their heading is used for aircraft coming towards the airport, not away.

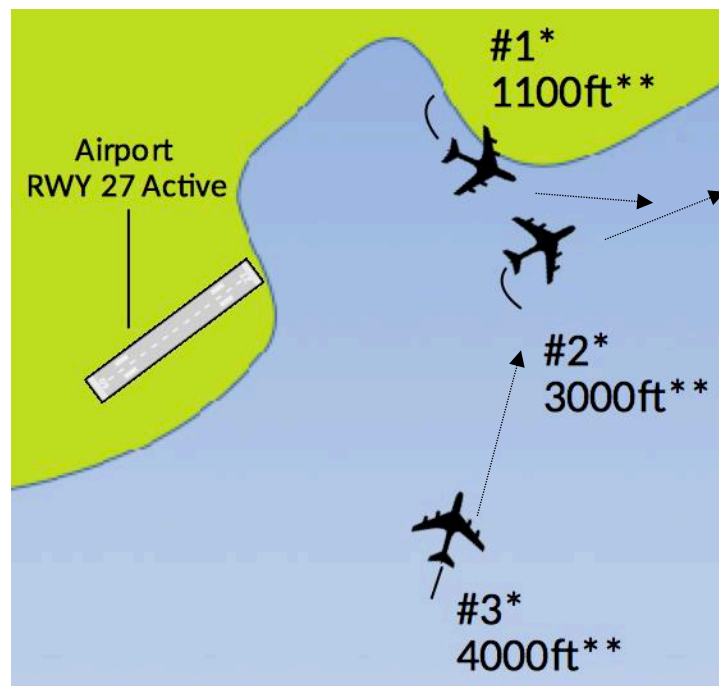


Figure 9 - Positions of Aircrafts After Initial Response in Episode 1

²⁵ Runway clipart retrieved from <https://pixabay.com/vectors/airport-runway-grey-asphalt-travel-36472/> and aircraft clipart retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

Having instructed #2, within 5 seconds Angelo instructs #3 to “maintain 4000ft”. Angelo issues this instruction to ensure that a potential conflict between #2 and #3 is avoided. After this instruction, Angelo sees that the vertical separation between #1 and #2 kicks in. He then instructs #1 and #2 to move towards waypoint Romeo and enter the hold. Waypoint Romeo is a point on the eastern arrival procedure used. He instructs #2 to climb to 4000ft. Angelo receives a call from #4 that they have reached 7000ft. Angelo overlooks this. Next, he instructs #3 (at 4000ft) to descend to circuit altitude (1500ft) so they could land first. Next, Angelo instructs #1 climb to 2000ft and then to 3000ft. This is because Angelo wants to move #1 above the minimum altitude and prepare it to enter the hold at waypoint Romeo, 1000ft below #2. He then instructs #4 and #5 to enter the hold over the airport at 5000ft and 6000ft respectively. Angelo then informs #1 and #2 in turn, that they may use the eastern approach procedure to try to come in to land again. Both agree. #3 lands first. Then Angelo instructs #1 to approach first, followed by #2. After #2, #4 and #5 are also instructed to come in. The aircraft at the lowest altitude is given priority (see figure 10²⁶ for aircraft positions). When it was all over, Alice (ATCA) said to a relieved but still tense Angelo, “you truly are a guardian angel”.

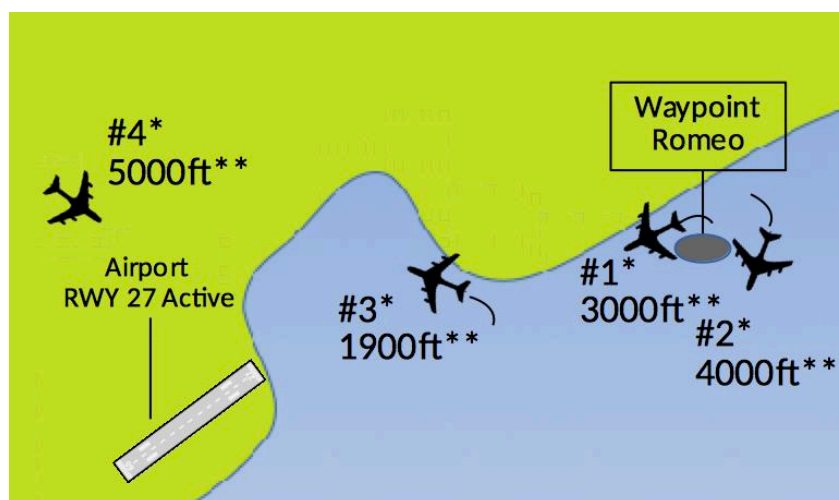


Figure 10 - Aircraft Positions (Episode 1 -continued)

²⁶ Runway clipart retrieved from <https://pixabay.com/vectors/airport-runway-grey-asphalt-travel-36472/> and aircraft clipart retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

Analysis Episode 1. Episode 1 presents the *appraisal* of shifting anticipations. It takes several seconds to restore Angelo's anticipation. He could now see that #1 and #2 were on a collision course. His new anticipation shocks, scares and stresses him. This is made evident by his body language. His face is drained of colour and he experiences an elevated heart rate. Both are associated with being scared (Ekman & Friesen, 2003, Chapter 5). Raised eyebrows and widened eyes are associated with surprise (Ekman & Friesen, 2003, Chapter 4). Standing up, throwing his pen, not taking notes and exclaiming suggests feelings of intense tension (Ekman & Friesen, 2003, Chapter 7). Notice that Angelo's initial emotional response was to a potential event that had not occurred yet. His emotional experience corresponds to the normative concern controllers have about safety.

Concern about safety is so taken for granted, that anticipating a deviation from this norm, results in spontaneous negative emotional experience (see Frijda, 2010a). In line, with the negative character of the emotional experience, Angelo spontaneously knows that this is a negative situation - a potential situation to be avoided. Angelo's repulsion to the anticipated situation is manifested not only in his emotional response, but also in his subsequent reactions (Frijda, 2010b).

The above suggests that by Angelo being concerned about the goods of his practice, he spontaneously *appraises* his anticipation of the situation in relation to them. In response, to his negative appraisal of his anticipation, he immediately (yet shakily) issues an avoiding action - an alteration to the path of #1. This also signifies the manifestation of the mood of attentive calmness - Angelo attempts to control his emotions and find a way to be calm and attentive so as to safeguard safety.

In parallel, the appraisal of anticipation based on concern about goods, also entails attraction to relevant affordances. Angelo's perception and actions are entwined with the *affordances* offered by and through his sociomaterial surroundings (see Rietveld & Brouwers, 2017). Affordances are action possibilities presented against the backdrop of an agent's experience in

sociomaterial distinctions (i.e., equipment, rules, procedures, language/terminology). Affordances can be manipulated to assist in addressing agents' concerns (Rietveld, 2012b, p. 106). The restoration of his anticipation allows Angelo to see that #1 and #2 afforded danger to each other. In other words, by according with separation rules and being concerned about goods (i.e., safety) - Angelo can see that #2 obstructs #1 safety, and vice-versa. Thus, the aircraft appear as repulsive to each other. To address his concern, Angelo must ensure that the aircraft do not collide. Hence, Angelo is intuitively ("first thing that came to mind") oriented to *the specific* affordances that were *relevant* to avoiding the potential collision. Intuitive orientation to relevant affordances based on the concerned appraisal of anticipations are experienced as a "*solicitation*". Put otherwise, to be *solicited* is to be non-reflectively attracted to certain *possibilities of action* offered by relevant affordances (Dreyfus & Kelly, 2007).

Angelo is solicited to the following affordances: aircraft #1, the altitude of 1000ft and #1's heading at the time. As illustrated in part 1 and 2, Angelo uses adjustments to altitude levels and designated airways as tools to fulfil tasks (e.g., sequencing to land and separation). By instructing #1 in this way, Angelo uses the altitude of 1000ft because it is vacant from the other aircraft and is clear from any obstacles (over the water). He could not instruct #1 to climb, as #2 was above. In other words, 1000ft appears attractive because #2's altitude of 1800ft appears repulsive. By instructing #1 to descend enables Angelo to open the vertical distance between #1 and #2. In addition, Angelo instructs #1 to maintain its current heading to open the lateral distance from #2 and because there were no inbound flights from that heading at the time (eastwards). This reaction is in line to Angelo's behaviour prior to this situation (part 1 and 2) - Angelo never allows an aircraft to be within 1000ft of another vertically, nor 8 miles laterally. However, to achieve the separation, in this occasion Angelo infringed the minimum altitude of 2200ft and in addition, by instructing #1 to head eastwards, #1 was heading counter to the eastern air route for aircraft to land. In Angelo's words: "I knew that I was violating the minimum, but I had

to do something to avert the crash. I also knew that at that point #1 was over the water, so there would be no problems”.

5.7.2 *Circumspection*

All the above entail *circumspection*. As can be seen by the unexpected occurrence, nothing in the sociomaterial field objectively ordains separation, safety or expedition - the controller must constantly issue adaptive instructions. The latter depends on a series of skills. Namely, the skill to anticipate, to be concerned, to appraise anticipation, reflect on breakdowns, see the implications of affordances and be solicited towards relevant affordances. All these skills depend on the controller dwelling in experience.

Philosophers of expertise refer to the perception of non-observational elements as *circumspection* (see Dreyfus, 1993; Haugeland, 2013). Circumspection is non-observational awareness (i.e., perception of elements that are not objectively part of perceptual scenes) that is developed through socialisation in practice and practical experience (Haugeland, 2013, p. 103). Indwelling, anticipation, reflection (in abnormal situations), concern, appraisal and solicitation are all part of non-observational awareness (i.e., phenomenal scene). This is why in previous sections, experienced and inexperienced controllers perceived different implications by looking at seemingly the same situation. Due to this non-observational perception, the meaning each agent saw was different. In turn, this made agents concerned about different aspects that as a result solicited them to towards different possibilities for action (Rietveld, 2012b; Wrathall, 2000, p. 113).

The relevance of affordances changes dynamically and relationally depending on the concerns and appraisals evoked by the anticipation of situational implications (Frijda et al., 2014; Rietveld, 2012b, p. 128). All the aforementioned depend on dwelling in past experience. A few seconds prior to his new realisation, Angelo was attracted to the go around procedure to expeditiously re-sequence the approaching aircraft. After restoring his anticipation, Angelo could see the situation from a different gestalt. Seeing that #1 was on an imminent collision path with #2, the go around procedure became

irrelevant. Priority was shifted from re-sequencing, to preserving the safety of #1 and #2. Thus, Angelo was attracted to an altitude below the minimum and a direction that was opposite to arrivals. These two unconventional instructions depart from pre-established procedures that do not permit aircrafts flying below 2200ft and that direction based on the wind direction at the time. As such, within a matter of seconds Angelo commits two acts of improvisation.

In addition, this suggests that the perception and utilisation of solicitations are the means through which controllers respond to situations. By dwelling in experience, affordances are spontaneously perceived as *attractive*, *repulsive or indifferent* depending on the aims of an agent (Dreyfus & Kelly, 2007, p. 52; Frijda, 2009, p. 267; Koffka, 1936, p. 345). In Rietveld's words, solicitations have an "affective allure" (2012b, p. 108). This is because agents' emotions in correspondence with the mood of attentive calmness spontaneously inform them about the meaning of the perceptual field (Solomon, 2007). When concerned, agents are spontaneously (Frijda, 2009, p. 267) solicited towards affordances that can relieve their emotional tension in line with the mood of the Practice. As it was explained to me in my first visits, controllers perceive a cylindrical field around aircraft which is 1000ft tall and 5 to 10 miles wide (depending on procedure) in which no two aircraft can be within at the same time (see image 11 from Allignol, Barnier, & Gondran, 2012, p. 3). To Angelo and other controllers, the cylindrical field around aircraft (under normal circumstances) appears as "repulsive" to other aircraft (Koffka, 1936, p. 392).

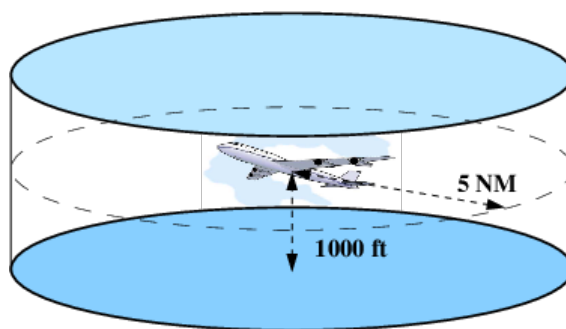


Figure 11 - Aircraft Separation Field²⁷

²⁷ Image retrieved from Allignol et al. (2013, p.3)

As illustrated throughout Episode 1, Angelo constantly seeks to repel aircraft from crossing the boundaries of this field, by issuing instructions depending on his anticipation of where an aircraft ought to be (Rietveld, 2012b, p. 109). Due to safety and accountability, altitudes below the dictated minima or within the repulsive field of aircraft usually appear repulsive. Altitudes which facilitate the task of the controller (e.g., to sequence aircraft to land) and are free of the minima or the fields of aircraft, appear attractive. Altitudes which do not facilitate the goal of the controller appear as indifferent. Notice, that the “oughtness” of the aircraft positions (i.e., outside the field) is normatively appraised. The rules of ATC deem that aircraft ought to be separated in a manner in which no two aircraft are within the “field” of the other. As illustrated in part 3, when the cylindrical field was violated, Angelo experienced a holistic response - anticipation of the imminent implications, negative emotional experience to the implications, negative appraisal of implications and the urge to forestall. All these responses are to dimensions of the situation that are not physically present (i.e., unobservable).

The process of circumspection (i.e., indwelling, anticipation, concern, appraisal, reflection and solicitation) is constantly and dynamically re-experienced as new developments in part 3 unfold. By seeking to address a concern which in turn will relieve tension of the appraisal, Angelo anticipates the implications of affordances by dwelling in experience in terms of attractiveness, repulsiveness and indifference (Koffka, 1936, p. 493). This complements Dreyfus (1993, p. 37) point, that the skill to deal with different situations and by extension affordances “involves not only acting but also not acting”. Being solicited towards certain affordances, entails being repulsed or indifferent to others.

To be solicited by relevant affordances is not inherent in the sociomaterial field, nor does it remain stable. “This field is made up of a figure-affordance we are currently directed at and responding to, and a multiplicity of more marginally present ground-affordances that solicit us as well” (Rietveld, 2012b, p. 108). The perceived sociomaterial field of solicitations is re-organized

depending on what an agent seeks to address in relation to the most recent developments and perceived anticipations (*ibid.*). A change in concern will present a different figure against the background of the sociomaterial field (Dreyfus, 1993, p. 35). Therefore, the perception of affordances occurs dynamically and relationally.

Returning to part 3, through circumspection Angelo is able to perform eight acts of improvisation. The third and fourth improvisations became apparent against the background of the first and second improvisations. Although #1 is set on a new trajectory and altitude, #2 changes their flight path without instruction. As signified by the time elapsed, Angelo engaged in reflection in action. During the reflection, a new anticipation emerges. Namely, that #2 would likely meet #1 again. The new anticipation of a new repulsive affordance is also negatively emotionally charged - it frustrates and worries Angelo. This is evident by his exclamation and shaking of hand. His new concern becomes the background against which his perceptual field once again changes. He is attracted to increasing the altitude of #2. Angelo is attracted to this because of the repulsiveness of his anticipation as well as the repulsiveness of #1 to #2. #1 could not descend any further and at the same time #1 was repulsive to #2, and vice-versa. #2 could climb without being an obstacle to #3, who was at 4000ft. So, he is solicited towards instructing #2 to climb to 3000ft, while also heading in the direction that was pre-assigned for arrivals. As he later explained, "I wanted to increase the vertical separation as fast as possible because it was too late for lateral separation, that's why I said 3000ft and not 2000ft." #2's incursion appears indifferent as it does not address his concern about safety. Angelo later specified that he "did not reprimand #1 and #2 because there was no point, I wanted them to be as cooperative as possible...I knew I had to keep my cool". This illustrates that Angelo reacted in line with attentive calmness by trying to remain calm (at least over the radio) and help the pilots.

The inception of the fifth and sixth improvisations depended on the previous actions. Specifically, as #1 and #2 were both moving in the same

direction - eastwards, opposite from the airport - Angelo had to ensure they could come back to land safely. During emergencies, the distressed aircraft are always given priority so as to assist pilots who might be experiencing stress which in turn could make them more likely to make mistakes. His concern that both aircraft do not stray too far away and to bring them back makes new affordances attractive. The waypoint Romeo, the holding pattern (see 49 in Glossary) and the altitudes of 3000ft and 4000ft. This waypoint appeared attractive because it lied just ahead of the trajectory of the aircraft. Thus, it would be easy for the pilots to reach. Moreover, the holding pattern appeared attractive because aircraft engage in orbits over a fixed position. By orbiting over waypoint Romeo, both aircraft could change their direction and could head for the airport again. In addition, waypoint Romeo was on the eastern approach procedure. This meant that pilots could use an instrument approach if they wished. This was important because instrument approaches lighten the workload of pilots. However, to be able to use the eastern approach, the minimum altitude was 4000ft. So, both aircraft had to be slightly higher than their altitudes at the time (especially #1 which was below the minimum altitude). Thus, the altitudes of 4000ft and 3000ft for #2 and #1 became attractive.

Notice, that to Angelo the fact that #1 was going to be 1000ft below the minimum for the eastern procedure did not appear repulsive because of the circumstances. #2 was flying at 4000ft, so the repulsion of the aircraft's field made increasing #1's altitude an unattractive option. In combination with time pressure and the maritime terrain being flat drew Angelo towards instructing #1 to approach to land. He did not find it attractive to instruct #2 to land first, because of the repulsion of #1 at 1000ft below it. As a safety precaution, controllers prefer to allow the lowest aircraft to land first. As a result of these actions the safe landing of all 5 aircraft was accomplished.

To be able to use the eastern approach and thus address Angelo's concern of assisting the distressed aircraft to land with priority, made aircraft #3, #4 and #5 appear as repulsive. Thus, Angelo was attracted towards

instructing #3 to land first (seventh improvisation). In this way, it cleared the eastern approach path for #1 and #2. Angelo anticipated that #4 and #5 would block the eastern approach route if allowed to continue their approach. Thus, the repulsiveness of Angelo's anticipation attracted him to the holding pattern, the airport's waypoint and the altitudes of 5000 and 6000ft. The combination of the four affordances would put #4 and #5 in a holding pattern over the waypoint which did not interfere with the eastern approach. In this way, #4 and #5 anticipated trajectories would be delayed until #1 and #2 had safely landed (eighth improvisation).

5.7.3 Illustration of Appraisal, Solicitation and Circumspection in Episodes 2 & 3

Like Episode 1, Episodes 2 and 3 can also be used to illustrate how appraisal and solicitations in relation to indwelling, anticipation, concern and reflection, allow controllers to circumspect.

Analysis of Episode 2 - 'Smelling' that something is wrong. After reflecting on the situation, Tom anticipated that the pilot was tired of responding to his high number of calls. He *appraised the anticipated implications* of the non-responding pilot in relation to his concern. He was concerned about safety (safeguarding the procedure at 2000ft) and about the assessment of his performance. He assumed that the pilot was just being uncooperative. On the background of these concerns, Tom felt frustrated. To remedy his frustration, the affordances of the microphone and the pilot appeared *attractive* and *relevant*. Tom was *solicited* towards insisting to get a read back even after trying 4 times and the pilot responding with "standby".

In contrast, Andrew became increasingly reflective that there was something technically wrong. Andrew, concerned about potential safety implications of a technical malfunction (e.g., radio not working) negatively appraises the situation. Thus, he is solicited towards the radio-telecommunication equipment. Miscommunication between aircraft and controllers may result in severe accidents. After establishing that the radio was in working order, Andrew turned his attention to the pilot. Upon hearing the pilot saying "standby", Andrew in contrast to Tom, anticipated that the pilot

was facing technical problems. In that instance, Tom is solicited to take over control from Tom and to offer assistance to the pilot.

Thus, Andrew engaged in two instances of improvisation. He deviates from the normal flow of a training session by initially paying attention to the equipment and later interrupting the session. Second, Andrew does not insist on following the procedures like Tom had done so far. He complies with the pilot not offering a readback. By finding different affordances attractive and anticipating different implications from seemingly the same situation, illustrates the manifestation of circumspection. By dwelling in different particulars (e.g., experience), the controllers were focally aware of different unobservable aspects of the situation. Their differing anticipations, concerns, reflections and appraisals painted the sociomaterial canvas in a different manner - they revealed different solicitations.

Episode 3, “His experience allowed him to see”, Part 3: #14 is very close to landing. Meanwhile, #11 specifies that they could not correct flap problem so a high-speed approach was requested. Norman complies. Paul who was sitting next to Norman, says “bring #14 in and get rid of planes departing in case of damage to runway by high speed approach”. Following Paul’s advice, Norman instructs #15 and #16 to enter the hold, and instructs the two departures to take off after #14 landed. Norman asks the ground controller to ensure that no other aircraft are allowed to taxi for departure and that there are no vehicles on any taxiways. This is done to prevent collisions in the event that #11 loses control. The above actions clear the path for #11 to approach. In addition, Paul asks the ATCA to notify the fire service to follow #11 after landing. The reason is to put out any potential fires. In Paul’s words, “the breaks of the aircraft could burst into flames, because they would be under more stress than usual”. Paul turns the runway’s edge lights to full brightness. In his own words, “of course there was daylight, but this was important. I wanted to give the pilot as much information as possible. When aircraft are landing, they can see the aiming point and they land with the rear of the aircraft. The pilot would not have much time to judge their position relative to the runway. #11 was going to come in

with the nose high, at a higher speed and then at the last minute the nose would hit the runway like a brick.”

The aircraft behaved in the way Paul had described. It was very tense and it did feel like it was taking a long time. Everyone was standing - eyes transfixed on the aircraft and the runway. For a few seconds, the control room was void of the normal chatter. The pilot managed to stop the aircraft within the limits of the runway. Despite lots of smoke from the aircraft’s breaks, there was no fire.

Analysis of Episode 3 (part 3): Norman’s concern and appraisal of his anticipation about the safety implications for #11, solicits him to offer a priority landing. On the background of his concern about expedition, Norman was also solicited to instructing #14 to land prior to #11 arriving. This did not conflict with the priority landing because #14 was very close to the airport. However, there were two more aircrafts approaching which appeared repulsive because Norman had to clear the way for #11 to land. The concern and negative appraisal about #14’s safety and by extension the intent to offer priority landing forms the background against which Norman is solicited to instructing #15 and #16 to enter the hold. Norman anticipates that #15 and #16 would reach the airport approximately at the same time as #11. The former would obstruct #11’s priority landing. As the implications of Norman’s anticipation were counter to his concern about #11, the hold over the airport appeared attractive. By instructing #15 and #16 to enter the hold, #11 would be able to approach the runway without interruption.

Norman does not engage with the two aircrafts waiting to depart. Paul, on the other hand, advises Norman to allow them to take off prior to #11 arriving. Paul is solicited to the departing aircrafts because of anticipating that upon landing #11 could damage the runway’s tarmac. This could delay the departures for hours. Thus, on the basis of Paul’s concern and appraisal about the implications of a damaged runway and by extension the expedition of the departing aircrafts; allowing them to depart was perceived as attractive. After

Paul's recommendation and as Norman values the same normative goods, Norman sees the valence of Paul's suggestion and instructs them to take-off.

Norman is solicited to informing the ground controller to stop any vehicles entering the taxiways. The attraction of the ground controller's interpersonal affordance derived from their role. As their role suggests, they had the authority to stop anyone entering the taxiways. The reason this was attractive to Norman was because he anticipated that #11 may not be able to remain on the runway. In case of this possibility, #11 could further endanger itself or other vehicles, which entailed a negative appraisal of this anticipation.

Paul is also solicited to two different affordances on the basis of his concerns and appraisal about anticipated implications. His experience of similar situations helps him anticipate that #11's "breaks would be under more stress than usual". This increased the possibility of a fire. To ensure safety and avoid a potential fire, Paul is attracted the interpersonal affordance of the ATCA. The ATCA appeared attractive because of the experienced time pressure. In Paul's words, "we had to prepare as soon as possible, the aircraft would arrive very shortly". The ATCA could notify the fire service for Paul, while Paul dealt with the runway's edge lights. The latter were attractive to Paul, because he anticipated that they could assist the pilot. Their attractiveness was perceived on the basis of how Paul anticipated that #11 would land. As #11 would not have the usual contact with the runway upon landing, the high intensity of the edge lights could afford the pilot orientation to stay aligned with the runway. The actions of both Norman and Paul entailed responses to phenomenal elements which are non-observational (e.g., anticipation, concern, appraisal, attraction to solicitations). Hence, all their responses manifested circumspection.

5.7.4 Summary

Through appraisal, achieving or forestalling anticipations is facilitated by agents being spontaneously attracted to solicitations (Benner et al., 1999, Chapter 3; Dreyfus, 1993; Dreyfus & Kelly, 2007). As established above, solicitations are situationally relevant affordances (Rietveld & Brouwers,

2017). Solicitations appear with “affective allure” depending on perceived normative concerns (Frijda et al., 2014; Rietveld, 2012b), manifested on the background of the Practice’s mood. Thus, their valence (or allure) is not inherent in affordances. It fluctuates depending on whether affordances are anticipated to help forestall or facilitate an agent’s concern about their anticipations. Hence, the ongoing appraisal of situational anticipations on the basis of concerns continuously creates instinctive gestalt shifts, wherein the agent is solicited to affordances that are likely to reduce the tension triggered by the deviations from the normatively optimal state (Dreyfus & Kelly, 2007, p. 53; Frijda et al., 2014; Rietveld, 2012b). As the created gestalt in which agents dwell in, in order to attend to situations is non-observational (i.e. is not part of the physical world) the processes of indwelling, anticipation, concern, reflection, appraisal and solicitation constitute circumspection (i.e., having non-observational awareness). The upshot of being solicited to relevant affordances, thanks to the experience of circumspection, is the enaction of practices to respond to the arising circumstances.

5.8 Practices of Improvisation

In the previous sections, by gradually showing the interrelation of indwelling, anticipation, concern, reflection, appraisal and solicitation through circumspection, I attempted to illustrate how improvisation is *experienced*. In this section I will focus on how circumspection is tied to *enacting* improvisation by using four practices of improvisation. In some cases, controllers deviated from established procedures to *introduce* new features. At other times, controllers *changed the pre-assigned roles* of the tools at their disposal. While in other cases, controllers would *disregard* deviations from procedures. Lastly on other occasions, would engage in *timing adjustment* by selectively prioritising the execution of procedures by certain aircraft over others. It should be noted that although I refer to each practice of improvisation separately, controllers usually used a combination of these practices when responding to a situation. Each of the four identified practices of improvisation will be

discussed below by drawing on the three illustrated episodes and four other incidents not discussed above.

5.8.1 Introduction of New Elements

Some situations triggered controllers to respond in novel ways. By novel ways, I mean responses that introduce a new element to predefined rules. Controllers respond in this manner by imaginatively extending pre-established procedures to address the exigencies of situations. Two instances of introduction were identified in Episode 3. Specifically, Norman introduces a new element to the approach procedure when he instructed #13 to orbit over its position in order to distance it from #12. In his own words: “a 360 is not a published holding pattern, but as long as the pilot can see the ground or sea, there is no danger of disorientation. I could have allowed #13 to continue their approach, but later ask them to perform a go around. This would just add another aircraft over Bravo. So I simply instructed #13 to perform an orbit to ensure that they land without any problems”. Second, Paul increased the intensity of the runway’s lights (in broad daylight) to offer better guidance to #11. This adjustment was not part of any official rules related to high-speed landings.

Another situation that clearly illustrates this practice is an episode that occurred beyond the three described episodes. Specifically, taxiway Alpha was closed for a week for maintenance. Alpha was routinely used for lining-up medium to large aircrafts to take off when runway 27 was in use (see figure 12). Insofar as this occurred, small aircrafts were lined up for take-off on Bravo. A key reason for keeping the two aircraft types separate was because the engines of medium and large aircraft create vortices that can potentially endanger small aircrafts behind them. Due to the closure of Alpha, controllers had to use Bravo to line up all aircrafts when runway 27 was in use. This posed negative implications for both safety and expedition. Light aircrafts could not go directly behind larger aircrafts in case they were damaged, while larger aircrafts, upon entering the runway had to backtrack from Bravo to the beginning of the runway in order to take off. During the first days, the controllers would usually prioritise larger aircrafts for take-off. Light aircrafts were allowed to take-off only after

medium or larger aircrafts had taken-off. This created large delays for smaller aircrafts. To add to these delays, usually, when a medium or large aircraft would take off, smaller aircrafts had to wait at least two minutes before they were cleared to take-off so as to ensure they would not encounter vortices.

On the third day after the maintenance had begun, Cecilia improvised a solution to the delays. She asked the ground controller to alternate the sequence of aircrafts taxiing to take off from Bravo, in a way in which a large or medium aircraft is followed by a light aircraft. Upon arriving at Bravo, Cecilia would ask the large or medium aircraft to enter the runway and backtrack (see figure 12²⁸, top). While doing so, for safety reasons, Cecilia also instructed the light aircraft to wait on taxiway Charlie until the preceding aircraft was on the runway. As soon as the larger aircraft was on the runway, Cecilia would instruct the light aircraft to line up on the runway and take-off. Smaller aircrafts do not need the whole runway to take off. In this way, lighter aircrafts took off approximately at the time as the larger aircrafts were turning around to line up (see figure 12, bottom). Upon take-off, Cecilia instructed light aircrafts to break to the left or right to make way for the take-off of the larger aircrafts. As soon as Cecilia would see that the light aircraft was clear of the take-off path, she would clear the larger aircraft for take-off. As a result of this new practice, Cecilia minimised delays for both large and light aircrafts.

²⁸ Maintenance/repair clipart and small red aircraft clipart were designed by Vexels.com. Big aircraft Retrieved from [on 16 Oct. 18] https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

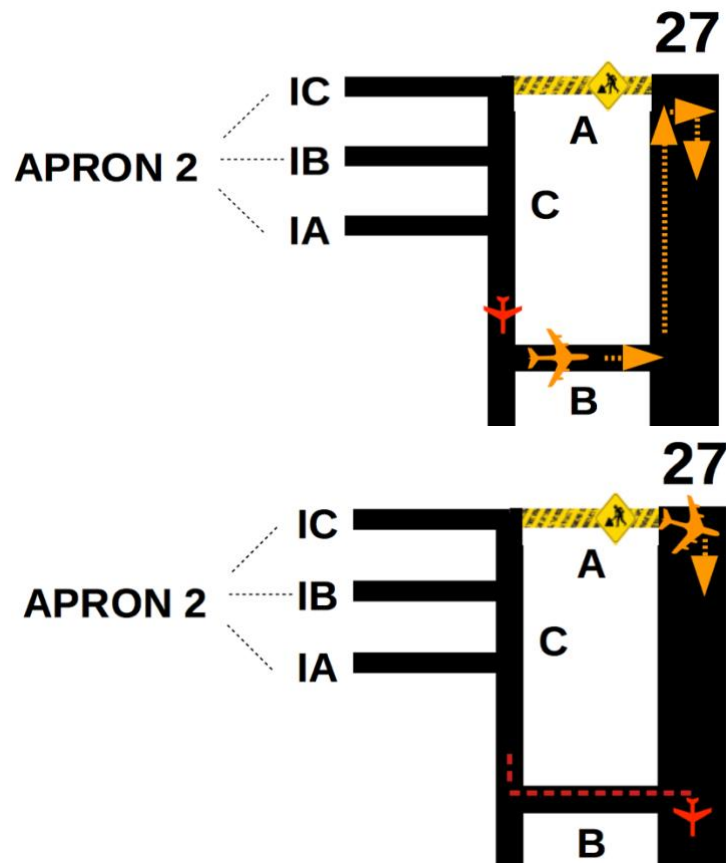


Figure 12 - Closure of Alpha and Improvised Response

5.8.2 Role Change

As discussed in Chapter 3, like humans who fulfil social functions (e.g., judge, controller etc.) (see Bechky & Okhuysen, 2011), equipment/tools also have predefined roles (Haugeland, 2013). During role change, controllers would use equipment/tools in ways that are beyond their conventional roles. Several instances of this practice are evident in Episodes 1 and 2. In Episode 1 (part 3) Angelo instructed aircrafts #1 and #2 to fly towards the opposite direction from the runway. In parallel, the specific direction was reserved for aircrafts approaching the airport. Angelo changed the purpose of the specific direction, from being used for arrivals to being used for avoiding a mid-air collision. In addition, after Angelo ensured the separation between #1 and #2, he instructed them to hold over waypoint Romeo. Holding patterns are traditionally used to delay or to allow aircrafts to perform system checks (see 49 in Glossary). In this

instance, apart from delaying the aircrafts Angelo also used the holding pattern to change the direction of the aircrafts (so they could re-approach the airport).

Another episode that clearly suggests an instance of role change was during an aircraft evacuation on Whiskey. This resulted in blocking taxiways Charlie and Lima (see figure 13). When runway 27 is in use, these taxiways are used to allow aircrafts to taxi from Apron 1, towards Alpha in order to take-off. The evacuation interrupted the arrivals and departures of aircrafts - this created major delays. As soon as the evacuation was completed, controllers were increasingly concerned about allowing aircrafts to continue their schedules. At the time (see figure 13²⁹) one aircraft (orange), which was parked in apron 1, was next in line for take-off. As Lima and Charlie were blocked by the evacuated aircraft (yellow) the controllers had to find an alternative route to get the aircraft to the beginning of runway 27. The standard taxi route was Lima, Zulu, Charlie and then Alpha (the designated alternative to the aforementioned route was Victor, Charlie and then Alpha). Aaron, the tower controller at the time, suggested the following to Hannah, the ground controller. He suggested that the departing aircraft could enter the runway from the end and taxi to the beginning (through Victor, Hotel, runway 09 and then backtrack to line up on runway 27). Thus, the introduced novelty in this instance was using runway 09 as a taxiway to line up on runway 27 (see dashed orange line).

²⁹ Aircraft figure retrieved from [on 16 Oct. 18]
https://commons.wikimedia.org/wiki/File:Airplane_silhouette.png

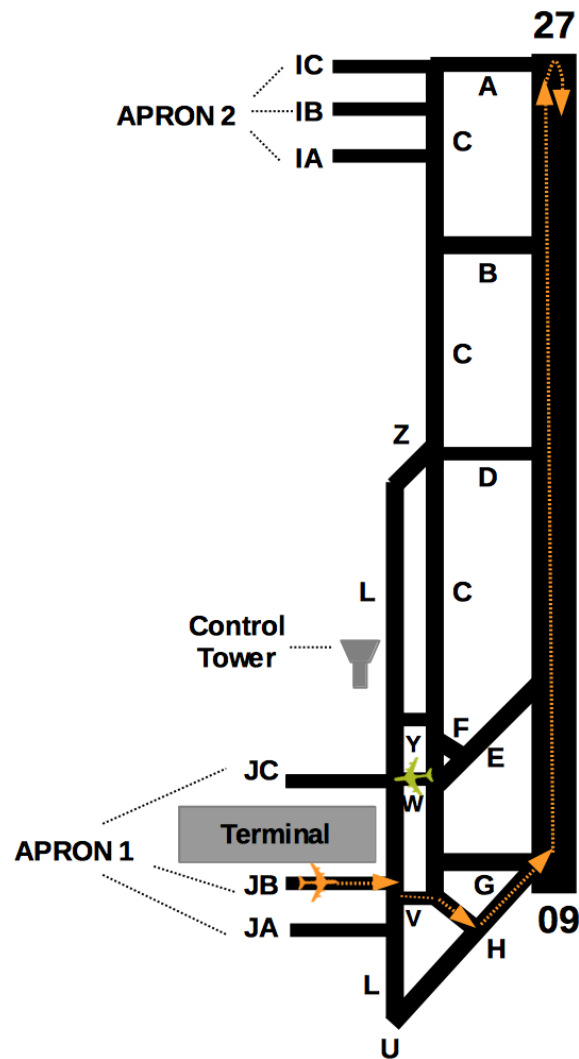


Figure 13 - Improvised Response to Closure of Whiskey

5.8.3 Disregard

In certain situations, controllers would overlook aspects of pre-defined procedures because they would contradict with what was judged to be a ‘good’ in a given circumstance (see MacIntyre, 2007; Tsoukas, 2018b). In Episode 1, Angelo engaged in three instances of disregard. First, the controller instructed #1 to descend to 1000ft. This instruction is below the minimum altitude prescribed by procedures. Angelo chose to deviate from the prescriptions in order to forestall an anticipated mid-air collision with #2. Second, Angelo is aware that #1 and #2 broke the rules by changing direction without permission. Angelo overlooks the discrepancy and does not insist on following the

procedures (e.g., like Tom did in Episode 2). Instead, he focuses on how to deal with the discrepancies in a way that maximised safety. As Angelo explained, he did not think that reprimanding the pilots at the time would have improved the situation. Thirdly, Angelo allows #1 to re-approach the airport from Romeo at 3000ft. The Romeo-approach procedure prescribes that approaches from the specific point should start from at least 4000ft. Angelo could not allow #1 to start the specific approach from 4000ft because the altitudes above #1's altitude were occupied by other aircraft. In Episode 2, Andrew engages in two instances of disregard. First, he overlooks that Tom was in a training session and takes over control. Second, Andrew does not insist on the pilot offering a readback. Andrew was drawn to both courses of action so as to offer assistance to the pilot, who was facing a technical problem. In Episode 3, Norman accepted to use the waypoint over the airport as an alternative to using the designated waypoint Bravo for #11's go-around. He overlooked the requested change to the go-around procedure because he assumed that it would be more helpful to the pilot.

Disregard was also identified in a situation wherein an aircraft requested an emergency landing due to smoke in the cockpit. This type of incident is one of the worst emergencies that aircraft crews and controllers can face. Smoke could poison the pilots, obstruct their visibility or even suggest fire which could render an aircraft unnavigable. Thus, in such situations the priority is to ground and evacuate the aircraft as soon as possible. Prior to landing, the airport operator instructed the controllers that they had designated a stand that was in apron 2. The operator had also instructed stair case trucks and ambulances to the stand they had assigned. However, apron 2 was on the opposite side of the usual vacation points of runway 27 (e.g. Echo). So, the distressed aircraft would have to taxi an additional 5 to 7 minutes to get to the stand that the operator had assigned. Apron 1, on the other hand, was only 1 to 2 minutes away from the usual vacation points of 27 (e.g., Echo). The controllers protested the operator's decision to no avail.

Harry, the tower controller at the time, decided to disregard the operator's instructions and pre-established procedures. Specifically, as soon as the distressed aircraft landed, Harry gave the pilot the freedom to stop the aircraft wherever they chose - even on the runway itself. This went against the dictum of the "constant use of the runway". Without the runway, no aircrafts would be able to arrive or leave. In the end, the pilot chose to stop on Whiskey. This blocked access to several taxiways and went against the operator's stand assignment. Upon stopping on Whiskey, Harry offered the pilot further freedoms - he gave the pilot the choice to use the evacuation slides (because it would take 3-5 minutes for the stair trucks to reach the aircraft from Apron 2). If the pilot complied with Harry's suggestion, the upshot would have been several people on the runway. A situation which under normal circumstances is unthinkable for safety reasons. In the end, the pilot chose to wait for the stair trucks. Everybody was eventually evacuated safely. Thus, in this situation Harry chose to disregard several procedures to safeguard the safety of the crew and passengers on the distressed aircraft.

5.8.4 Timing Adjustment

In some situations, controllers would attempt to adjust the timing for the execution of aspects of procedures. That is, in some cases controllers would attempt to expedite or delay the execution of procedural aspects depending on the exigencies of situations. In Episode 1, Angelo engaged in two instances of timing adjustment by re-ordering the landing sequence. He allowed #3 to land first (was initially third in sequence), while #1 and #2 were heading to waypoint Romeo. In addition, Angelo instructed aircraft #4 and #5 to enter the hold over the airport. All three timing adjustment actions ensured that the two distressed aircraft (#1 and #2) could have a clear approach path. In Episode 3, Norman engaged in 5 instances of timing adjustment. Upon #11's go around request, (1) Norman cancelled #12's approach and in turn requested that the aircraft entered the hold over the airport. After #11 requested to hold over waypoint Bravo, #12 was allowed to re-start their approach. However, as #13 was getting closer to #12, Norman (2) introduced an unpublished holding pattern to ensure

appropriate distancing between the aircraft. After Paul's recommendation, (3) Norman allowed two departures to leave prior to #11 landing to avoid any delays caused by potential damage to the runway. (4) Norman requested that all approaching aircrafts enter the hold until the consequences of #11's landing were known. Finally, (5) Norman liaised with the ground controller to ensure that no aircrafts or other vehicles could taxi until after #11's landing.

Beyond the described Episodes, Pauline faced a situation which called for several instances of timing adjustment. In particular, three aircrafts were approaching to land. The second aircraft was getting closer to the first. Initially, Pauline requested that the second aircraft continued their approach with minimum speed. The pilot, however, did not comply and continued to remain close to the first aircraft. Thus, Pauline requested that the second aircraft orbited to their right in order to increase spacing. The pilot refused to comply with Pauline's suggestion by stating that such a measure was "unnecessary". Thus, Pauline cleared the second aircraft to approach visually and to maintain its own separation from the first aircraft. Pauline anticipated that the two aircrafts were still too close to each other. Thus, Pauline instructed the third aircraft to enter the hold in order to be ready for her anticipation that the second aircraft would have to 'go around'. Indeed, the first aircraft managed to land, however, it could not vacate the runway in time for the second aircraft to land. Thus, Pauline instructed the second aircraft to 'go around'. Hence, Pauline kept the third aircraft in the hold until the second aircraft went around to re-approach the airport.

5.9 Findings Summary

Improvising in response to unfolding situations is tied to circumspection. Specifically, circumspection depends on indwelling, anticipation, concern, reflection, appraisal and solicitation. The first process, indwelling, entails perceiving current situations on the background of past experience. Anticipation, the second process, refers to the notion that controllers can foresee imminent situational developments by dwelling in both their past-experience

and ability to use the tools of their trade (e.g., terminology, procedures, equipment). Dwelling in past-experience permits controllers to identify situations as specific sorts, which in turn allows them to extrapolate similarities from previous experiences to the present. What controllers anticipate is not indifferent to controllers - it is tied to the third process, concern. Controllers are concerned about anticipated implications by dwelling in what is assumed to be good in their practice (i.e., safety and expedition in alignment with the mood of attentive calmness). Thus, anticipated situations are spontaneously weighed in relation to taken-for-granted normatively defined goods. Their concerns about goods evoke emotional reactions which motivate responses to intervene. The fourth process alludes to reflection; occasions wherein the controllers' anticipation collapses because they encounter situations which are unexpected. Without an anticipation, controllers are uncertain about how to react. When such situations arise, controllers reflect in or on action, in order to restore their anticipation. The fifth process refers to the moment at which controllers intuitively appraise whether their anticipation should be attained or forestalled, on the background of their concern about the goods of their practice. Depending on whether their anticipation is appraised to be attractive or repulsive, controllers spontaneously solicit them to affordances that are situationally relevant to their goal.

The combination of the aforementioned processes allude to circumspection - the ability of controllers to have a non-observational awareness of situations and their implications. Indwelling, anticipation, concern, reflection, appraisal and solicitations are all non-observational experiential phenomena. Despite its non-observable nature, circumspection enables the identification of relevant affordances which are subsequently drawn on in order to enact improvisation practices. That is, controllers typically engage in four types of improvisational practices - introduction, role change, disregard and timing adjustment.

CHAPTER 6: DISCUSSION - TOWARDS A NEW THEORY OF IMPROVISATION AND BEYOND

“the enactment of even stable routines or plans involves more than repetition”
Cunha et al. (2017, p. 560)

“there is an intrinsic indeterminacy when organizational members interact with the world – hence the need for them to fill in the phronetic gap by imaginatively extending a category beyond prototypical cases”
Tsoukas (2011b, p. xiv)

6.1 Introduction

In the present chapter I will summarise the study, discuss the findings in relation to the literature on improvisation and suggest the latter’s implications for future research and practice. The goal is to build on the findings of the preceding chapter and the theoretical constructs discussed in Chapter 3 in order to offer an advanced phenomenological understanding of improvisation and the enactment of improvisation practices. Like most process studies, the insights generated from this dissertation may raise questions of generalizability (viz. whether they apply across organizations) and boundary conditions. Hence, I will discuss how the generated insights about improvisation may generalize to organizational settings beyond ATC. Finally, I will discuss the implications of this study in relation to future research.

6.2 Summary of the Study

The purpose of this study, as stated in the initial research question, is to capture how agents enact and experience improvisation. As argued in Chapter 2, lived experience of improvisation has been overlooked (Fisher & Barrett, 2019). Further examination of this feature is important because “real time experience on action is the defining characteristic of improvisation” (Miner et al., 2001, p. 316). Despite this admission, with very few exceptions, most studies on

improvisation offer retrospective accounts (Cunha et al., 2006, p. 326) that tend to marginalize the experience of agents by focusing on functionalist characteristics (see also Shotter, 2017). By the latter I mean that scholars have tended to discuss improvisation in terms of its outcomes (e.g., actions taken, novelty of actions), but have overlooked the processes by which agents are able to *perceive* the improvised actions in the first place.

A central claim of this study is that achieving improvisational outcomes is tied to perceptions of the “goods” of practices (MacIntyre, 2007; Moore, 2017; Tsoukas, 2018b), emotional reactions to situations (Damasio, 1994; Frijda, 2010b; Solomon, 2004, 2007) and tacit knowledge (Ribeiro, 2014). In Chapter 3, through a synthesis of practice theory, phenomenology and strands of ecological psychology I attempt develop a theoretical framework that is amenable to capturing both the lived experience of agents improvising, as well as the enaction of improvisation itself. Capturing the experience of agents while improvising can shed light on how agents accomplish improvisation on a daily basis. This is because agents in parallel to attending to current occurrences, also attend to how the latter will affect future occurrences by dwelling in their experiential background. Thus, improvisation, in many cases, is about attaining or forestalling occurrences that have yet to materialise. As outlined in Chapters 4 and 5, to this end I studied an ATC unit located at a European international airport by spending approximately 530 hours in situ and conducting numerous interviews with participants of differing levels of experience. This setting was ideal for studying improvisation because it hosts a complex activity in which unexpected situations need to be addressed in a matter of seconds - otherwise they could result in severe negative consequences.

6.3 Theoretical Contributions to Organizational Improvisation

The findings of the study shed light on the broader research question of *how agents enact and experience improvisation*, through addressing two sub-questions:

(1.1) How do agents perceive relevant affordances for the enaction of improvisation?

(1.2) How does the use of affordances influence the enaction of improvisation practices?

In answering the above, this study contributes to the literature on organizational improvisation by offering a new theoretical framework that has a strong-process view through which to understand the enaction as well as the experience of enacting improvisation. The framework introduces and synthesizes existing conceptual distinctions in a novel way to explain improvisation. In the next paragraphs I will outline the framework and its contributions by relating this study's findings with the existing literature.

This study's framework for understanding organizational improvisation suggests that circumspection is fundamental to perceiving relevant affordances that allow agents to improvise (see figure 14). Specifically, circumspection alludes to agents being able to focally perceive a phenomenal field (i.e., aspects of situations that are unobservable) around a perceptual scene (i.e., what can be observed), which in turn draws them to improvise. Circumspection is theorised to manifest indwelling, anticipation, concern, appraisal and solicitation in mundane situations. In abnormal situations (i.e., breakdowns), circumspection is theorized to also include reflection. The result of circumspection is the agent been drawn to either mundane improvisation (i.e., responding to normal exigencies) or critical improvisation (i.e., responding to abnormal exigencies) through the use of a relevant affordance (i.e., solicitation). Both types of improvisation may be enacted through an improvisation practice (i.e., introduction, role change, disregard or timing adjustment). All aspects of the framework will be elaborated and discussed in relation to the literature below.

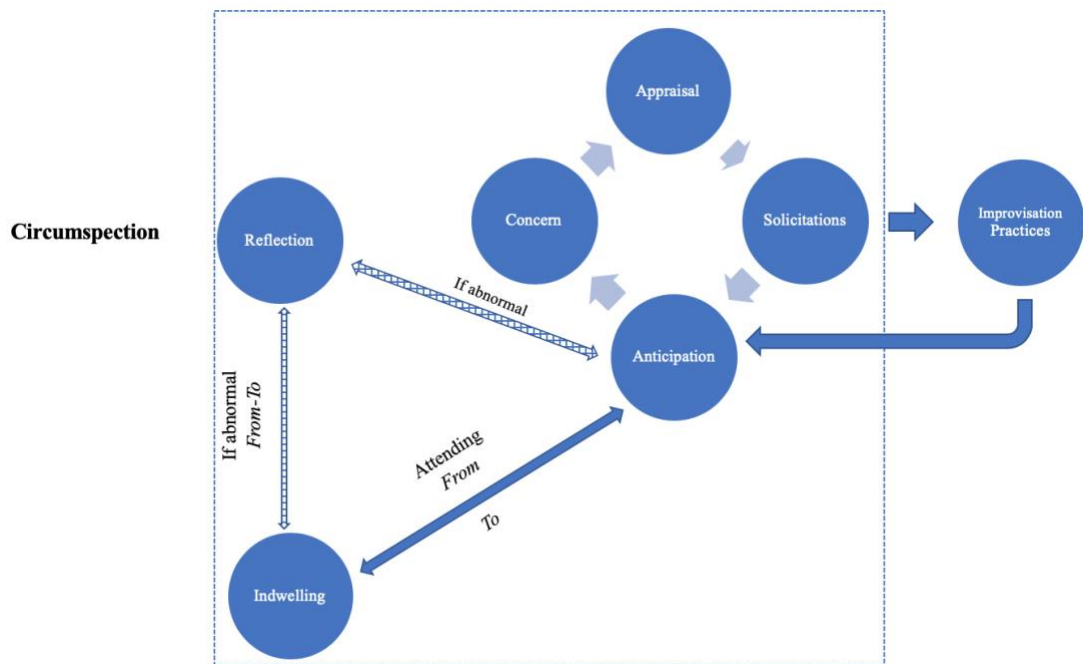


Figure 14 - Enacting and Experiencing Improvisation

Before discussing the framework, I would like to highlight that it is novel for three reasons: (i) it highlights the role of indwelling in relation to improvisation, which has not been hitherto clearly explained (e.g., see Yanow & Tsoukas, 2009, pp. 1349–1350), while at the same time circumspection has been broadly neglected in management to such an extent that the relationship between the two processes has not been previously established; (ii) by using ongoing processes to explain improvisation introduces a strong conjunctive process theorization of improvisation that captures the enactment and lived experience of improvisation; and (iii) by analysing circumspection in terms of its constituent processes allows the introduction of anticipation, concern, appraisal, reflection and solicitations to the theorization of improvisation. All the latter concepts have neither been used for the explanation of circumspection and improvisation (with the exception of reflection), nor interrelated between them in the management literature. In parallel, concern and appraisal allude to the hitherto marginalised *role of emotions, moods and goods in improvisation* and thus help overcome rationalist-cum-functionalist understandings of the phenomenon. Moreover, this study introduces a new phenomenological

interpretation of reflection (as restoring anticipation) and breakdowns (as the collapse of anticipation) that helps to better grasp the lived experience of unexpected situations.

In the next subsections I will explain the interrelationship between the processes that give rise to circumspection, as well as how they are all tied to experiencing and enacting organizational improvisation.

6.3.1 Circumspection

Perceiving the exigencies unfolding developments, in Heideggerian terms, is referred to as *circumspection* and is an indication of a high level of expertise (Dreyfus, 1991, p. 66; Haugeland, 2013, p. 103). What is meant by this term? As Dreyfus (1991, p. 66) puts it, it is a case of “non-thematic, non-self-referential awareness”, or as Heidegger (1982, p. 163) puts it is “it is the view in which the equipmental nexus stands at first, completely unobtrusive and unthought”, which according to Haugeland (2013, p. 103) gives rise to “non-observational awareness”. Put otherwise, if we had a camera on top of an agent’s head that captured all their movements, including exactly where the agent looked while performing an action, it would not be sufficient to capture what the agent perceived. This is because an agent’s perception is characterised by circumspection; perception manifests non-observational/phenomenal elements that orient their attention.

The phenomenal elements pertain to perceiving the situation from a gestalt (on the background of dwelling in their past experience) that enables agents to anticipate, be concerned, appraise and be solicited to certain affordances depending on the situation. All the aforementioned concepts are considered to manifest circumspection since they are not visible to the eye of an unskilled observer, but nevertheless their integration transforms the perceptual scene presented to agents. Each of the constituents of circumspection will be further discussed in relation to improvisation in the next sub-section.

6.3.2 Indwelling

As established in Chapter 3, indwelling, the basis of tacit knowledge, is a perceptual process through which one is able to be focally aware of an object of perception by attending from subsidiary awareness (Polanyi, 1966; Tsoukas 2011). Socialization in Practice enables practitioners to dwell in an inarticulate background (e.g., past experience) against which they perceive unfolding developments (Polanyi, 1961; Ribeiro, 2014). The latter was illustrated in Chapter 5 by showing that as ATCOs accumulated experience they were increasingly able to spontaneously respond to situational exigencies by being subsidiarily aware of their past experience. For example, novices showed difficulties responding to situations because they tended not to know which response was relevant, as they were not sure about the implications of situations. Experienced ATCOs, in contrast, were intuitively drawn to responses by being better able to see the implications of situations. As such, dwelling in practical experience permits agents to perceive the exigencies of unfolding developments.

Dwelling in experience cultures a practical sensitivity that enables agents to simultaneously: (i) perceive contextual nuances and (ii) which aspects of their practice's equipmental nexus are relevant to address exigencies. As each situation has its idiosyncrasies, which can neither be predicted nor captured in rules, perceiving contextual nuances and finding ways to cope with their exigencies inevitably leads to improvisation.

Agents are not automata that blindly follow rules. As Ryle (1949) and Wittgenstein (1986, §54) have illustrated, justifying the application of a rule leads to infinite regress – one would require a rule for each rule they choose to use, *ad infinitum* (see also Harré, 2002, pp. 115–116). Although during training controllers learn idealized forms of procedures and related phraseology in the form of rules, neither are sufficient for coping with unfolding situations; both are merely “an aid in teaching” the practice (Wittgenstein, 1986, §54). Rules merely serve as “guidelines”. The abstractness of rules cannot stretch itself to cover the complexity and uniqueness of concrete practice - small differences

across situations (e.g., weather, aircraft type, pilot, airline policy). In parallel, situations do not come with a priori labels, which pre-specify that a given situation is a case of X which should be responded to by doing Y (Tsoukas, 2018a, p. 9).

To overcome the aforementioned hurdles, agents must constantly strive to cover the chinks left exposed by the rules through improvisation. This requires indwelling (i.e., attending from past experience in Practice). Through indwelling, agents fill “the gaps left open in a situation” (Polanyi, 1961, p. 465) to perceive which rule/procedure is relevant as well as when and how to use it. The use of rules/procedures, however, requires adaptations to fit the idiosyncrasies of the situation. This is consistent with the view that improvisation “involves some degree of innovation because [it] involves the creation of action outside current plans and routines” (Moorman & Miner, 1998a, p. 4).

Indwelling is tied to circumspection because it entails viewing unfolding situations on the background of a non-observational gestalt (i.e., past experience in Practice). However, as will be illustrated below, indwelling is also important for the other underlying processes of circumspection: anticipation, concern, appraisal and solicitations, and if facing an unusual situation, reflection in response to breakdowns.

6.3.3 Anticipation

Seeing that a situation is of a specific sort (see Haugeland, 2013) is tantamount to being aware of what immanent situations imply (i.e., their practical significance/immanent consequences). By this I mean, that perceiving a situation as a case of a specific sort that requires a specific response, implies that agents spontaneously *anticipate* the implications of situations based on dwelling in past experience (Polanyi, 1961; Ribeiro, 2014). Hence, controllers are drawn towards the response that will allow them to address the possible eventualities of arising situations. This occurs spontaneously because situations present themselves to skilled agents from a gestalt - agents *attend from* their past experience of dealing with similar situations *to attend to* current situational

exigencies. The latter suggests that having different levels of experience changes what one anticipates in a given situation. Thus, when two agents with different levels of experience face exactly the same perceptual scene, they are likely to have different anticipations (e.g., as in Episode 2).

It should be highlighted that anticipation does not entail that situations are dealt with in exactly the same manner, or exactly as the rules prescribe. Rather, because each situation has unique characteristics, agents, over time, develop the ability to be subsidiarily aware (Polanyi, 1966b; Taylor, 1995, Chapter 5) of the ‘family resemblance’ (Wittgenstein, 1986, §67) across situations and in turn can creatively cope with the situation through improvisation (more about this later) (Taylor, 1993, p. 57; Tsoukas, 2011b, p. xiii). Put otherwise, their past experience serves as an indwelling - an inarticulate background (i.e., gestalt) against which family resemblances and relevant responses are revealed. How? As Dreyfus (2013, p. 35) explains, with experience agents see “the results of hundreds thousands of actions”. Through the latter, the agent develops a “sensitivity to subtler and subtler similarities and differences of perceptual patterns. Thus, learning changes, not the [agent’s] mind, but his world” (ibid.). This phenomenological interpretation offers an alternative account to the dominant information processing approach to improvisation. The benefit of this account over cognitivism is that unlike the latter, the former can explain how agents deal with current situations that are not identical to past situations (and thus cannot be retrieved from memory) (see Bingham & Eisenhardt, 2011; Kyriakopoulos, 2011; Moorman & Miner, 1998b). To be able to make the improvised adjustment necessarily relies on anticipation because otherwise agents would not know what a situation calls for.

Anticipation is a concept that has sometimes been mentioned in passing in relation to situated action (e.g., Benner et al., 1999; Hutchins, 2010), but has been broadly neglected in explanations of improvisation. Moreover, it has been more popularly used under the guise of the cognitivist framework by referring to it as expectation (or expectancy frameworks) to discuss the phenomenon of

sense making (e.g. Gioia, 2006; Patriotta & Gruber, 2015; Weick, 1988, 1993b; Weick & Sutcliffe, 2015). According to Weick (1988, p. 307), expectations are “if-then assertions” based on previously observed outcomes, which have been “summarized internally” by individuals, and that are associated with cues from current situations (see also Maitlis & Sonenshein, 2010, p. 564). Consequently, Weick (1988, p. 307) maintains that “the organization and the environment are in the mind of the actor” and that “action precedes cognition”.

This study’s conception of anticipation builds on phenomenological research to overcome the dominant retrospective focus found in cognitivist accounts describing perception (Holt & Cornelissen, 2014; Sandberg & Tsoukas, 2015) and by extension improvisation, by capturing the prospectiveness of situated responses. In contrast to Weick’s (1988) notion of expectation, I suggest that anticipation precedes agents’ actions and is possible due to perceiving situations through gestalts. In mundane situations agents’ anticipation *simultaneously* adjusts to developments and precedes their actions because they are *already attending from* their past experience. For example, in the beginning of the Guardian Angel Episode, Angelo was giving instructions to aircrafts to descend based on his anticipation of how the aircrafts would descend. Anticipation came first and the response followed. In non-routine situations, anticipation may change several times due to uncertainty, but nevertheless anticipation needs to be restored through reflection before action (more about reflection later). For example, later on in the Guardian Angel Episode, Angelo’s anticipation about what aircraft #1 was doing had collapsed and was restored several times before he could improvise in relation to the situational exigencies. Thus to enact an improvisation, one must be polarized from their anticipation (which depends on dwelling in past experience), thus improvisation does not precede anticipation.

A study that has engaged substantively with anticipation, albeit in the context of sensemaking, is Goia and colleagues (2002, p. 625). The authors (ibid.) define anticipation “as the ability to see an issue and head it off by looking to the future and solving your future problem by manipulating the

future perception of the present and the past”. Despite the surface similarity to my explanation of anticipation there are substantive differences. In their study the authors focus on the malleability of organizational history and identity. Thus, notice that in their definition they mention that a future problem is solved by the *manipulation of future perception*. This suggests that they see anticipation as part of the discursive practice of “spinning” stories (ibid. p. 627). An example they offer is that of a university official who specified that “if you tell people that your vision is that, in five, ten, or 15 years they will be seen as graduates of a great university, they will buy into it” (ibid., p. 627). This illustrates that, unlike this study, Gioia et al. (2002) do not examine anticipation beyond spinning stories. Hence, this study adds by showing how agents spontaneously attend to anticipated future problems in the midst of ongoing action.

Similarly, anticipation may bear affinity to Cunha and colleague’s (2012, p. 265) metaphorical presentation of improvisation as “real time foresight” for strategizing. The authors highlight that organizational environments constantly change unpredictably (see also Mintzberg, 1994). This in turn, often makes established strategies redundant. Hence, Cunha and colleagues (2012) argue that organizations may benefit by foregoing emphasis on planning. Instead, organizations must try to intentionally detect weak signals and improvise in response to them.

While these insights are largely aligned with the findings of the thesis, the main difference of “foresight” in relation to “anticipation” is twofold. First, in the context of this study anticipation unlike foresight, is not seen as a metaphor, but as a skill that is developed on the basis of immersion in practice. Second, foresight, in the context of strategizing, and especially in trying to detect weak signals, alludes to conscious reflection. As established by past studies (Dreyfus, 1991; Yanow & Tsoukas, 2009), conscious reflection is enacted in response to unusual situations. The latter, in the context of Cunha et al.’s (2012) study, can be conceptualized to be tantamount to seeking and responding to weak signals. In contrast, anticipation, in the context of this

thesis, is argued to manifest itself in non-reflective action. Therefore, this study's conceptualization of anticipation incrementally adds that it can be a feature of non-reflective action, and at the same time underlines that it has been a hitherto unnoticed, skill (not only a metaphor) that agents rely on and hone on a daily basis.

6.3.4 Concern and Appraisal

Appraisal is a concept that has not been previously related to improvisation. Appraisal helps understand how anticipation is directed to an improvised response. To understand appraisal, however, one must first bear in mind that it is intimately tied to "concern" about the internal goods of the practice (Moore, 2017, p. 67). Thus, I will first explain "concern" and then gradually show its interrelation with appraisal. Both allow this study to usher in and show the importance of emotions and moods to organizational improvisation, which have both been marginalized. Emotions are understood to be judgements about the world and thus directly relate to aspects of an agent's world (e.g., something appears to be stressful, shocking) (Solomon, 2007, p. 204), whereas moods are understood as an orientation of engagement with encountered situations - a way of "being tuned in to the things in the world" (Dreyfus & Wrathall, 2005, p. 5). For example, stress or shock should not be allowed to such a degree that would paralyze an agent, but should be experienced up to a degree that will allow them to preserve their Practice's internal goods.

Through socialization in practice agents become concerned about their practice's internal goods (MacIntyre, 2007; Moore, 2017; Tsoukas, 2018b). For example, in ATC the agents were taught from the very beginning of their training to care about two internal goods - safety and expedition. Both are extremely important, to the extent that controllers are held accountable for their preservation. The notion of concern as a concept can be traced to Heidegger (2013, p. 458): "Dasein exists as an entity for which, in its Being, that Being is itself an issue". In other words, agents are always concerned about the way in which they are engaged in the world (see also Benner et al., 1999; Benner,

Tanner, & Chelsa, 2009), because they always *attend to* their experiences by *attending from* the background of their concerns.

Through socialization in practice, over time these goods are taken for granted by all agents to such a degree that they *dwell in* them. That is, agents spontaneously see unfolding situations in terms of upholding their practice's goods. For example, if one is a controller they will see situations in terms of whether safety and expedition are upheld. Indeed, agents care so much about their practice's goods, that when jeopardized strong emotional responses are evoked (e.g., worry and shock Angelo experienced when he anticipated the aircraft collision). While only referred to in passing, emotions in studies of improvisation are viewed as "resources" people draw upon to improvise (Cunha et al., 1999, p. 302). For example, feeling that one can trust their teammates has been associated with a positive relationship between improvisation and innovation (Vera & Crossan, 2005). Focusing on emotions qua resources and researching as variables in interaction with other variables, suggests that how emotions are experienced and directly affect improvisation has been overlooked (Cunha et al., 2017, p. 567).

Thus my account explores how emotions are experienced in response to developments and in turn how they affect improvisation. I find that emotions are a form of appraisal about situational developments based on their concerns - attending from internal goods makes agents perceive whether they are upheld. When they are upheld agents remain poised, but when they are jeopardised agents experience negative emotions. Concern solicits agents towards appraising developments and orienting their attention to responses that would safeguard their practice's internal goods. As such, different appraisals change the gestalt from which agents perceive the situation and thus change which responses are perceived as relevant. *Attending from positive or negative emotions to the situations changes the quality of how a situation is experienced.* The quality of the experience (i.e., positive, or negative) is a manifestation of the appraisal of a situation in relation to whether a Practice's internal goods are upheld or jeopardised. Preserving the internal goods offers the emotional

motivation to react to situations. Thus emotions are a judgement about whether situations are developing in accordance to normative significations (i.e., internal goods).

Responses to situations, however, while emotionally charged (Solomon, 2007) depend on already being immersed in the mood of the Practice (e.g., if you are a controller the mood of attentive calmness). The Practice's mood is learned through participation (see appx. 3). Mood, from a phenomenological angle, is an orientation of engagement with encountered situations (Dreyfus & Wrathall, 2005, p. 5) and "constitute[s] the range of ways in which things are able to matter to us" (Ratcliffe, 2013, p. 159). Hence, the major difference between emotions and mood is that, the former is directed to something (e.g., something appears stressful), while the latter "is not directed at something within the world" (e.g., attentive calmness prescribes an orientation to react in a specific way) (ibid., p. 159). For example, controllers learn that they must not allow stress to overcome them, nor show their stress to pilots; they must be calm and attentive to the needs of pilots. The main reason for this is to preserve the cooperation of the pilot and thus uphold safety.

The mood of attentive calmness may bear some resemblance to the notion of emotional labour (Hochschild, 2003; Holman et al., 2008). However, the difference with attentive calmness is that as a mood, it is more primordial than organizational directives that make emotional labour salient (e.g., airlines instructing/training flight attendants to smile at all times). To enact organizational directive requires being skilful in a Practice, which *presupposes* being in a mood wherein a Practice's internal goods matter. For example, Angelo did not let his shock and panic overwhelm him when he realised that the aircrafts were going to crash so he could preserve safety. Instead by being in the mood of attentive calmness, he tried to keep calm and give clear instructions to the pilots so as to ensure they avoided the collision.

Holt and Cornellissen (2014) argue for a Heideggerian conception of mood. However, the authors (2014, p. 534) implicitly equate emotions with moods (e.g., "the fear felt at Mann Gulch, for example, is a mood"). Moreover,

“a mood...does not add emotional colour to pre-given objects of experience” (Ratcliffe, 2013, p. 159). Moods, as specified above, constitute an orientation of engagement to situations (Dreyfus & Wrathall, 2005, p. 5). Hence, this study adds that emotions are experienced and reacted to in response to exigencies on the background of the broader mood of a Practice and its internal goods.

While this study is not the first to distinguish emotions from moods (e.g., Beedie, Terry, & Lane, 2005; Gray & Watson, 2001), it contributes to the improvisation literature by introducing a phenomenological distinction between the two and showing the role of both in relation to improvisation. That is, emotions signify an engagement and judgement about the world (e.g., something appears as stressful) on the background of being concerned about the practices of internal goods. Mood, on the other hand, is a disposition that allows agents to have a sense about the appropriate (in relation to the internal goods) range of responses to occurrences. For instance, while an imminent collision can make a controller feel fear and stress, the mood of attentive calmness helps the agent balance these emotions in a manner that enables them to improvise in response to the situation in a way that safeguards the internal goods of their Practice. For example, Angelo (Episode 1) facing a similar situation was not paralyzed by fear or stress, nor did he run away or hide under the desk. He told himself to “do something” and he did in a manner that was consistent with his concern about the goods of the practice.

“Concern” may bear affinity to “commitment” (i.e., the reasons given for agents’ behaviour) (Weick, 1988, p. 310). According to Maitlis and Sonenshein (2010, p. 562), “commitment serves as a foundation for sensemaking. This is because individuals often generate explanations retrospectively to justify actions to which they have committed”. Although, this may be true in certain occasions, I argue that the internal goods of a practice (MacIntyre, 2007; Moore, 2017; Tsoukas, 2018b) predispose agents’ concerns (Dreyfus, 1991, p. 238; Heidegger, 2013, p. 238). That is, in the case of ATC, by dwelling in safety and expedition and enacting them through the mood of attentive calmness, ATCOs appear to be predisposed to engage with a situation

in a way that will preserve the goods. This illustrates that, when engaged in practices, the reasons for doing things are far from being “uninteresting” or retrospectively created (Weick, 1988, p. 310), people are always pre-concerned about situational developments (Heidegger, 2013, p. 238), because “practices only acquire sense when organised around an end or object” (Nicolini & Monteiro, 2017, p. 112).

To summarise the above, dwelling in *concern* about the internal goods of a practice serves as a background against which to *appraise* one’s anticipation of developments. That is, with every action taken, the anticipation and appraisal of its implications spontaneously generate emotional reactions (that are experienced through broader moods) that enable agents to perceive whether the anticipated outcome of the situation is positive or not. As suggested above, this creates a gestalt that presents the salient features of situations. The interrelation of anticipation with concern and appraisal is an ongoing process, akin to a loosely orchestrated choreography in which every reaction to a situation is simultaneously followed by an anticipation, concern, an affective appraisal of the anticipation and a subsequent re-reaction through available equipment (more about this below).

The appraisal of the anticipation each reaction evokes, intuitively makes the *engaged* agent to perceive it under a positive (viz., attractive) or a negative (viz., repulsive) light (Koffka, 1936; Morris, 2012). That is, a positive gestalt is perceived when and if the anticipation of the implications of a situation is aligned with the goods of one’s practice. A negative gestalt, is perceived when and if the anticipation of the implications of a situation is not aligned with the goods of one’s practice. When positive, agents seek to attain the anticipated implications. When negative, agents seek to avoid the anticipated implications. Appraising implications and seeking to either attain or avoid anticipated implications are entwined with relevant affordances (viz., solicitations). This is because actions are enabled insofar as at they are carried out through the relevant affordances.

6.3.5 Solicitations

The use of affordances is malleable. Although their use may be governed by normative conventions (Haugeland, 2013), they may, under certain situations, be used unconventionally. Unconventional use of materials is something that studies on bricolage have implied (Baker & Nelson, 2005). However, the difference of my conceptualization to the aforementioned studies is that I move beyond the “functionalism” of bricolage studies (Visscher et al., 2018) and introduce the notion of solicitations (i.e., situationally relevant affordances - more about this below) to understanding improvisation.

This is useful because it shows that relevant affordances are only perceivable on the basis of experiences in value-laden background of practice. I also show that unconventional use of affordances, is tied to the internal goods of practices and appraisal. Unconventional use, entails that an action is not done for the sake of the action itself, but for the sake of an outcome. Outcomes are desired, as discussed in Chapter 3, on the background/horizon of goods valued by practices (see Taylor, 1995). Thus, to use something unconventionally, without being held accountable (and thus punished) for the deviation, must be underpinned by the preservation of the internal goods of the practice.

Thus, agents on the basis of concern and appraisal are non-reflectively *attracted* towards the affordances which are relevant to attaining or avoiding one’s anticipation by attending from their concern about their practice’s internal goods. This suggests another element of perception – that specific affordances intuitively stand-out as relevant, useful and thus attractive on the background of anticipation, concern and appraisal.

Situationally relevant and (by extension, *attractive*) affordances are referred to as *solicitations* (Dreyfus, 2002; Dreyfus & Kelly, 2007; Rietveld & Brouwers, 2017). Like the sirens in the Odyssey (Homer, 1999) that beckoned sailors to their sides, solicitations wield an “affective allure” (Rietveld, 2013, p. 25) that is intuitively perceived on the background of agents’ situational concerns and experience. The affective allure of solicitations is entwined with the emotional reactions anticipations evoke – engaged agents *are concerned*

about appropriately coping with situations and as such, are drawn to solicitations. Their emotional reactions orient them towards solicitations, insofar as they dwell in the mood and significations of their practices. Agents are always in the process of perceiving and responding to solicitations on the basis of appraising anticipations. Consequently, this permits an understanding of where an agent's attention is drawn to in the midst of action, which in turn allows one to come closer to being inside the moment of improvisation.

6.3.6 Reflection in Response to Breakdowns

When agents do not know what to anticipate, they experience a breakdown and as such, engage in reflection. Reflection in response to breakdowns will be explained in the next paragraphs.

Insofar as situations deviate from what is typically anticipated, agents often experience a breakdown in their performance. Breakdowns have tended to be interpreted as a cognitive collapse of meaning or sense (Cunha et al., 2006, p. 324; Weick, 1993b) in which, some scholars argue that information from long-term memory need longer to be associated with short-term memory (Moorman & Miner, 1998b). My study aligns closely with the phenomenological view of breakdown, in which scholars have tended to highlight that there are degrees of breakdown that cause agents to reflect in or on action (Dreyfus, 1991; Haugeland, 2013; Yanow & Tsoukas, 2009).

Drawing on the data, I build on the phenomenological interpretation of breakdowns (Yanow & Tsoukas, 2009), to illustrate a new point. Breakdowns do not entail the absence of meaning, as Weick (1993b) has argued (cf. Colville et al., 2013, p. 1217). Rather, breakdowns are perceived as an absence of what is normally anticipated - *a collapse of anticipation*. This is because responses are based on what is anticipated (Ribeiro, 2014). In more severe instances of breakdowns (e.g., total), the latter is followed by a reflective investigation. That is, the agent tries to understand what to anticipate (e.g., Angelo looked outside the window, asked the pilot). Without knowing what to anticipate, responses are postponed until an anticipation is restored through reflection. During the breakdown, motivation to restore the anticipation is fed on the background of

an agent's concern about the practice's goods. Unlike cognitive interpretations I try to show that restoring anticipation through reflection necessarily relies on already indwelling and thus caring about the significations of practice (e.g., internal goods, terminological distinctions, tool use) – without the latter (i.e., if meaning was lost) (cf. Weick, 1993b; Weick & Sutcliffe, 2015), restoring anticipation and thus improvisation would be impossible.

6.3.7 Improvisation Practices

During my fieldwork two qualitatively different types of improvisation were documented – mundane and critical improvisation. The former suggests that to deal with mundane situations agents must make minor adjustments to procedures to cope with exigencies (referred to as “baseline improvisation” by Cunha et al., 2017, p. 561). The latter suggests that agents must make major adjustments to procedures to cope with exigencies. This finding is consistent with other studies that have highlighted different levels (e.g., from minor to major) of improvisation (Cunha et al., 2006, pp. 323–324; Moorman & Miner, 1998a, p. 12; Orlikowski, 1996).

Thus, like past studies I highlight that the type of improvisation depends on both the perceived degree of deviation a situation has from mundane enactments, but unlike past studies, I suggest that the desideratum of both types of improvisation is to preserve the goods of the practice. The closer a situation is perceived to be in relation to preserving the goods of a practice the more likely it is that mundane improvisation will be enacted. The further away situations are perceived to be from preserving the goods of a practice, the more likely it is that critical improvisation will be enacted in order to preserve the goods.

Improvising is tied to solicitations. As already explained, being drawn to solicitations (i.e., relevant affordances) stems from circumspection. Solicitations are perceived spontaneously when agents engage in mundane improvisation, or after reflection when agents engage in critical improvisation (because the latter is usually accompanied with a breakdown). While responding to different *solicitations* under different circumstances influences

what type of improvisation is enacted (mundane or critical), it *simultaneously* influences which improvisation practices are enacted. This section will focus on explaining how responding to different solicitations entails different practices of enacting improvisation.

Four types of improvisation practices were identified: (i) introduction of new elements, (ii) role change, (iii) disregard and (iv) timing adjustment. The interesting aspect of identifying different practices is that even though agents may respond to a seemingly identical affordance, the *manner* and *circumstances* under which the latter is responded to, may constitute an entirely different improvisation practice. As it was shown in the previous chapter, as a situation unfolds agents continuously need to respond to the results of their previous employment of an improvisation practice through a different improvisation practice. In this section, however, each identified practice will be explained and discussed separately in relation to the types of improvisation practices already identified in the literature.

(i) *Introducing new features* refers to controllers enacting responses to situations that are not already prescribed in the rules. To do so entails using a relevant affordance in an *unprecedented* manner in order to add to a predefined procedure depending on the exigencies of situations for the sake of the practice's goods. Other scholars have documented similar instances of improvisation, although they have not labelled them as constituting a specific improvisational practice. Specifically, while Weick's (1993b) description of Dodge's improvised response to the Mann Gulch disaster and Brady's (2011) account of General Chuikov's improvised battle tactics during the battle of Stalingrad, illustrate that their responses were novel for their time – they refer to both with the generic label improvisation. Other researchers highlighting highly novel improvisations maintain that agents abrogate past conventions to do so (Baker & Nelson, 2005; Moorman & Miner, 1998a). Given that practices constitute the horizon of meaning (i.e., what is good or bad, how a tool is conventionally used), there is no parthenogenesis. While this may be the case, this does not imply that agents simply recycle sociomaterial responses from

their organizational structure (Bechky & Okhuysen, 2011). Rather, by drawing on existing meanings agents are often able to create new responses that are consistent with the underlying goods of their practices.

(ii) *Role change* refers to controllers enacting responses to situations by using their equipment unconventionally. To do so entailed using a relevant affordance in a way that does not conform to its traditionally assigned role so as to ensure the practice's goods. Unlike Bechky and Okhuysen (2011, p. 246) who confine role change (in their own words "roles shifting") to instances in which people swap pre-conceptualized organizational roles (e.g., conventional camera person substitutes the absent aerial camera person), I argue for a broader conceptualization. In particular, I argue that role changes can entail enacting a role that has not necessarily been organizationally pre-defined, and that role changes can also encompass changes to the traditional usage roles of equipment. While the latter form of improvisation practice bears affinity to the concept of bricolage used in studies focusing on resource improvisation - i.e., "making do by applying combinations of the resources at hand to new problems and opportunities" (Baker & Nelson, 2005, p. 333) – there are significant differences. Traditionally improvisation through bricolage is conceptualized through a functionalist prism. That is, "as a rational response to environmental constraints" (Visscher et al., 2018, p. 356). As illustrate above, I conceptualize role change (viz., the unconventional use of affordances) as a value-laden response to exigencies (Castoriadis, 2005b) in order to preserve the internal goods of practices (MacIntyre, 2007; Moore, 2017).

(iii) *Disregard* entails intentionally overlooking *aspects* of the pre-defined rules/procedures in order to conserve a "good" of their practice. In terms of affordances this practice encompasses intentionally *overlooking* the use of a pre-scribed affordance. One study that mentions a similar phenomenon called "ignoring" (Lok & De Rond, 2013, p. 198), defines it as "a form of reflexive normalization work through which unusual or unexpected behaviour is accounted for in terms of a common stock of knowledge through which this behaviour is made understandable and explainable, and thus normalized". In

addition to the latter only being used in reference to institution theory, not improvisation, the other significant difference to my conceptualization is that disregard can be both reflexive or spontaneous and is directly related to the internal goods of an agent's practice.

Disregard, as a finding, serves as a link between creative deviance and organizational improvisation. Creative deviance is defined as overlooking the directions of management to work on a new idea (Mainemelis, 2010). Creative deviance has been studied mostly in the context of innovation studies, where ideas are "first proposed" to management, but are often rejected because they are "perceived as weird" (ibid., p.558). Thus, creative deviance has not been studied as it has been in this study; as a spontaneous improvisation to arising contingencies. Disregard suggests that creative deviance can arise instantly due to pressing situational exigencies and as a result, the agent may not have time to propose their idea to management. Moreover, the creative deviance literature, focuses mostly on the "individual" (ibid., p. 559), whereas I focus on the agent embedded in practice. Thus, I show that creative deviance, in the form of disregard, is not tied to an individual in a vacuum, but tied to embedded agents who are concerned about the internal goods of their practices.

(iv) *Timing adjustment* refers to the practice of tweaking the timing of the execution of pre-scribed phases of procedures. In terms of affordances this practice entails intentionally manipulating the timing at which an affordance is used in order to preserve the practice's "good". This bears some similarity to Bechky and Okhuysen's (2011, pp. 246–249) notions of "reorganizing routines" and "reordering the work". The former relates to reorganizing the execution of routines based on a learned repertoire, whereas the latter relates to changing the order in which their work is fulfilled. The difference of both to timing adjustment is that it does not only entail changing the timing the execution of whole routines/procedures, but only aspects of procedures. Moreover, instead of adopting a functionalist-cum-structuralist view of organizations, in which improvisation is seen as a pure response to achieve a

pre-specified goal (Visscher et al., 2018, p. 356), I suggest that timing adjustment is, again a response to preserve the internal goods of practice.

6.3.8 Summary of Theoretical Implications for Organizational Improvisation

In this subsection, I will first summarize the improvisation framework (figure 14) and then highlight the major contributions of my thesis. Coping with contingencies is achieved through circumspection (i.e., non-observational awareness). The latter depends on dwelling in an experiential background against wherein agents are concerned about their anticipation of situational developments. They appraise the implications of their anticipation through the experience of emotions (evoked in relation to the practice's goods) and moods, and improvise in response to their appraisal through solicitations (i.e., relevant affordances). In abnormal cases, the cycle is interrupted because agents' have difficulty anticipating what is occurring. Consequently, they need to reflect on the situation so as to restore their anticipation, and thus be drawn to a solicitation. Utilising solicitations depending on the circumstances can result in mundane or critical improvisation. Mundane and critical improvisation can be achieved through the practices of introducing new features, role change, disregard and timing adjustment. The improvisation enacted starts a new cycle which needs to be responded to.

The above framework contributes to the improvisation literature in a number of ways. First, it clarifies the role of tacit knowledge (as indwelling) in improvisation. Specifically, it shows that tacit knowledge is a gestalt that agents dwell in so as to attend to the meaning of situations. This is tied to the second contribution; introducing circumspection to the explanation of improvisation. The latter illustrates that perceiving meaning of situations affects how improvisation will be experienced and enacted through solicitations. Circumspection is non-observational and draws upon dwelling in past experience, as well as the other entwined processes of anticipation, concern, appraisal and solicitations (i.e., the relevant affordances used to improvise).

Each process introduces new elements to the theory of improvisation. Anticipation, enables one to capture the prospectiveness of perception. So far,

most research has had a retrospective focus (Cunha et al., 2006, p. 326; Sandberg & Tsoukas, 2015; Shotter, 2017). Concern in conjunction with appraisal permit a phenomenological understanding of emotions (Solomon, 2007) and moods (Ratcliffe, 2013), as well as a MacIntyrian (MacIntyre, 2007) understanding of internal goods in the process of improvisation. Past improvisation research has marginalised emotions, has not delineated between moods and emotions (Holt & Cornelissen, 2014) and has viewed improvisation as a simple rational/functional response to situations (Visscher et al., 2018, p. 356). Solicitations permit an understanding of where an agent's attention is drawn to during improvisation, which in turn permits one to come closer to the lived experience of improvisation. The latter has also been greatly overlooked (see Fisher & Barrett, 2019, p. 149). Reflection and breakdowns are a given a new phenomenological interpretation. Breakdown is understood as the absence/collapse of anticipation, instead of the complete collapse of sense (Weick, 1993b). Reflection is understood as the processes through which anticipation is restored.

Additionally, four types of improvisation practices are seen to result from circumspection depending on the use of affordances as solicitations. These being: introducing new features; role change; disregard; and timing adjustment. It should be noted that once an improvisation is enacted, another will be required in response. Above, I have argued that each type of improvisation practice adds a dimension that has been overlooked in organizational research.

Finally, the framework shows that improvisation is an ongoing accomplishment that depends on the entwinement of several underlying processes. Consequently, it offers a strong process understanding of improvisation. Moreover, the framework shows that the improvisation depends on the enmeshment of several processes. This in turn, permits a conjunctive (Tsoukas, 2017) view of improvisation.

6.4 Implications for the Theory of Affordances in Management

The above interpretation of affordances, has implications about how the concept is currently used in management studies. First, by drawing on phenomenology (Dreyfus, 2002; Dreyfus & Kelly, 2007; Rietveld, 2012b; Rietveld & Kiverstein, 2014), strands of ecological psychology (see Gibson, 2015a), and weaving the insights of both the latter with practice theory (mainly Heideggerian-Wittgensteinian and neo-Aristotelian) (see Nicolini, 2012), I try to illustrate the process through which affordances are prospectively perceivable in engaged action. In management, this has not been previously explained.

Management scholars understand affordances as possibilities for action that arise from an object or an environment (see Fayard & Weeks, 2007, 2014; Leonardi, 2011). However, I suggest that the notion of affordances requires further refinement, because agents are always surrounded by a plethora of affordances. This raises the question of how agents are drawn to specific affordances? I argue that affordances stand out to agents insofar as affordances exert a non-observational, affective allure over agents (see also, Rietveld, 2012b). The term *solicitations* captures the experienced attraction of relevant affordances (i.e., where an agent's attention is oriented to). But it should be noted that to be solicited by an affordance prerequisites that an agent is skilled and that the affordance in question is relevant to addressing situational concerns (which are based on the goods of their practice).

Second, through the notion of *solicitations*, it becomes clearer that perceiving relevant affordances is tied to emotions (Frijda et al., 2014), moods (Ratcliffe, 2013) and internal goods. How? As already explained above, agents dwell in their practice's internal goods. This suggests that agents care about the way they perform their practices. Thus, to see the relevance of an affordance is tied experiencing emotions through a mood. Experiencing emotions is a type of concernful appraisal that informs agents about whether situations are developing in line with the goods of their practice. If a situation is not, the perceptual field of the agents is repolarized by emotions and mood - attention

is beckoned towards the affordances that will help them remedy the situation. The understanding of affordances being tied to emotions, moods and the goods of practices has not previously featured in management. It permits a richer understanding of lived experience.

6.5 Implications for Practice Theory and Phenomenology

The use of circumspection in relation to indwelling, anticipation, concern, reflection, appraisal, and solicitations contributes to the literature as a first attempt to bridge practice theory with phenomenology and strands of ecological psychology in management studies. While Neo-Aristotelian practice theory (e.g., MacIntyre, 2007) highlights the importance of goods to motivating the behaviour of agents, and Heideggerian-Wittgensteinian practice theory (e.g., Haugeland, 2013; Taylor, 1995) highlights the importance of practices for the creation of a horizon of significance (Nicolini, 2012), no study (as far as I am aware) has previously explained how both strands of practice theory are related as well as enacted and experienced by agents. In this study, I argue that internal goods (from Neo-Aristotelian practice theory) are entwined with the horizon of significance of practices (from Heideggerian-Wittgensteinian practice theory) by learning to dwell in them as subsidiary particulars.

At the same time ecological psychology pays more attention to perception (Gibson, 2015a), while phenomenology pays more attention to the experience of the agent (e.g., Dreyfus, 1991). Neither ecological psychology nor phenomenology, focus extensively on how practices affect the experience, or perception of agents (e.g., see Ribeiro, 2017). In this study, I pay attention to both elements and I show, I hope, that dwelling in experience of practice makes agents care about normative significations (which include internal goods and conventions) by taking for granted their importance. What is taken for granted is implied to be the horizon of significance.

Like others (e.g., Ingold, 2002), I illustrate that situational developments are experienced, perceived and responded to on the background of the horizon of significance. Unlike others, I show that the latter is entwined with indwelling,

anticipation, concern, appraisal and solicitations (from phenomenology and ecological psychology) through the process of circumspection (from phenomenology). Therefore, I suggest that the perceptual field of agents is non-observational (i.e., agents circumspect) because of dwelling in the significations and experience of practices. Circumspection allows agents to focus their attention on aspects that are critical to preserving their practice on the background of their previous experiences. The synthesis permits to have richer understanding of agent responses by simultaneously taking into account their perceptual and emotional experience in relation to their practice's internal goods. Thus, I hope to have illustrated that Neo-Aristotelian and Heideggerian-Wittgensteinian practice theory, in conjunction with phenomenology and ecological psychology can be combined to offer an interpretation for both the enaction and experience of agent behaviour.

In addition to the above, my conceptualization of circumspection also seems to validate recent observations about temporality in management studies and contribute to the temporality of enacting practices. Specifically, Schatzki (2006) and Hernes (2014) suggest that the present entails both the past and the future. While my study, especially through the notion of anticipation (how agents perceive in the present how current situations will unfold in the future based on dwelling in their past experience), implies the same, it takes an additional step. The framework of circumspection, can be used as a plausible explanation as to how temporality is experienced by agents. This is because, circumspection is conceptualized to be the *bridge* between the past and the future. How? Agents gain practical experience through participating in practice and over time they begin to dwell in significations. Experience serves as a *gestalt*, which in turn allows them to become more skilled in discriminating between situational nuances. Thus, I have shown that when agents encounter a situation and have the requisite experience (developed in the past) to anticipate how present situation developments will unfold in the future. This is a matter of concern and is spontaneously appraised on the basis of normative significations learned and taken for granted in the past, and solicitations are

presented to them based on how they would like their future to be. For example, in Episode 1, inexperienced Tom did not anticipate that the pilot was facing problems, whereas experienced Andrew could. Both had different levels of experience that allowed them to anticipate and be responsive to different affordances.

6.6 Methodological Implications

This study has some methodological implications. It has been previously highlighted that it is difficult to identify and thus study both improvisation (Cunha et al., 2017, p. 567) and tacit knowledge (Gourlay, 2006). The methodological design used by this study could prove helpful in qualitatively researching both aforementioned phenomena in the future.

Specifically, in regards to improvisation it has been specified that “one cannot deduce from the content of particular performance how much in what way it involved improvisation processes” (Cunha et al., 2017, p. 567). In the context of this study its findings rested on the ability to disambiguate improvisational processes. To achieve this it relied on a two-step process. First, the researcher had to become immersed in the written/official rules of the practice under examination. This is important because it allows the researcher to have an intimate understanding of what is instituted, on paper at least, as a non-improvisational performance. Second, the researcher has to compare actual performances with the written rules. Any discrepancies identified between the two can be argued to be improvisational. In case, that there are no written accounts of rules, then one must consult with members of the practice. During the consultation the researcher would have to establish what procedures are necessary for the enaction of a procedure. Then, for each procedure the research should establish what is considered to be a normal performance. After this, s/he can then compare discrepancies between actual performances with the oral account offered by members of the practice.

In regards to tacit knowledge a combination of observation and interviews were used to recognize its manifestations. It should be noted that

identifying its manifestations does not foster the ability of the researcher to actually perform what they research. First, the researcher must observe work performances of agents. During this time the researcher must take very detailed notes on the series of actions agent enacts (i.e., actions, facial expressions, body posture, terminology and equipment used) or ideally, if they have authorization, to video record. Particular attention must be paid to instances of breakdown because they reveal “the taken-for-granted distinctions practitioners cannot articulate while absorbed in practice” (Sandberg & Tsoukas, 2011, p. 351).

Second, a short period after the performance (ideally exactly after, or at most three to four days later so they do not forget) the researcher should ask the participant questions about the recorded performance. Due to circumspection it is important to understand what the agent perceived. The researcher, being unskilled suggests that s/he perceives the situation from different gestalt and as such cannot perceive the shared perceptual scene in the same way their skilled participant does. As such, I would tend to refer to the date and time of the observed performance and ask the participant to offer an overview of what they were doing. This allows to establish a common reference point for the rest of the interview. After this by drawing on the notes (or video if one can), I would refer or show each discrete action and I ask the participant to explain what they perceived. After this I would ask them how what they saw made them feel. Feelings are spontaneous emotional judgements about the world (Solomon, 2007). Identifying them enables one to understand whether a situation is tacitly considered to be good or bad. After this I would ask them to explain the actions they took and why they did so. Both the latter allow one to understand what is a common sensical response to situations. Finally, I would ask them if they considered any alternative actions prior to enacting their response. The latter, allows one to identify whether a breakdown (and thus reflection) occurred and to identify any other common-sensical responses that could have been used. This process would be repeated for other similar activities and when different people were enacting them.

Third, I compared the performance of similar actions performed by experienced and novice participants. By comparing the results of the two aforementioned steps collected from different participants, can help the researcher become aware of the differences between performances and perception, based on the different experiential gestalts the two groups attend from. The assumption behind the last claim is that more experience changes the way situations are perceived (for example see Ribeiro, 2014).

6.7 Practical Implications

A key finding of this study is that improvising depends on dwelling in an often tacit gestalt of past experience that informs perception. Orwell (1946) once remarked “to see what is in front of one’s nose needs a constant struggle”. As such, this study has practical implications for management by attempting to bring to the fore what tends to be right in front of practitioners’ noses when they improvise, but usually struggle to notice. As phenomenology implies, careful reflection on everyday experience can assist in becoming aware of the often unnoticed sides of organizing, and can enable management to make more conscious decisions about the tacit dimensions of organizations.

Rules, general as they are, “cannot guarantee a correct result because they contain what a person ought to do, but not how” (Nussbaum, 2009, p. 339; see also Harré, 2002, pp. 115–116). As illustrated in this study, even mundane situations require agents to find an appropriate response by creatively extending conventional responses to the exigencies of the situations. Given that there is always an element of improvisation in action (see also Crossan & Sorrenti, 2002, p. 46; Tsoukas & Chia, 2002), management should be mindful that while rules may guide practitioners’ attention to some aspects, their appropriate use during action requires practice. This was also illustrated in another study wherein the lack of practical experience with a procedure led to dire results (see Colville et al., 2013). This suggests that instituting new rules, although helpful is not enough to achieve results. Staff need to become familiar with them so as to develop the know-how that will enable them to accord appropriately with the

rule (Harré, 2002, p. 116). Use of simulations, if possible, should be especially encouraged as they may increase one's experience in according with rules.

Following from the above, when reviewing critical incidents deviations from rules/procedures should not always be seen simply as a reprimandable violation (Weick, 1998). Prior to judging whether the response was appropriate or not, requires a careful consideration of the unique situational characteristics which may have led a member of staff to choose a seemingly idiosyncratic response. Tolerance and consideration of improvised responses are important to avoid rigidity. Rigidity, especially in critical situations may prove to be counter-productive (see Barrett, 1998, pp. 619–620; Weick, 1993b; Weick & Sutcliffe, 2015, p. 14).

In many cases, improvised responses can prove to be useful source of learning – either as examples worth mimicking or avoiding (see Barrett, 1998, pp. 610–611; Weick & Sutcliffe, 2015, pp. 12–14). In addition, as improvisation may entail using equipment that is not routinely used it may uncover areas of weakness that require improvement through upgrading material equipment or the need for further training in immaterial equipment (such as phraseology and procedures). In parallel, it is also important that material equipment (even if seldomly used) is well maintained and can be accessed from their designated space. In regards to immaterial equipment, it is important for staff to be well versed in the latter even in aspects that are less frequently enacted.

Furthermore, while technical proficiency is vital, so is emotional attunement (e.g. Damasio, 1994). This is because emotions are spontaneous and engaged judgements about the appropriateness of situations which are experienced on the background of moods, both of which are developed through socialization (Solomon, 2007). To improvise appropriately necessarily entails both an emotional appraisal about whether developments are desirable or not (Frijda et al., 2014), and at the same time, it must be enacted though a suitable mood. Both the latter are shaped by what is assumed to be the internal good of a practice (MacIntyre, 2007; Moore, 2017). Therefore, management could cultivate self-awareness about the meaning of emotions, in order to avoid

feeling overwhelmed by emotions during critical situations. Also, management must pay attention to cultivating appropriate emotional responses to situations through practice, as well as through explaining the importance of responding in an emotionally appropriate manner (e.g., attentive calmness). This is because staff may have developed habits of emotional responses prior to joining the organization that may be incompatible with its objectives.

6.8 Boundary Conditions and Limitations

Some may consider the fact that this study, like most process studies, does not seek to offer a theory that can be generalized across all organizational settings as a limitation. However, this is not necessarily a limitation, but a boundary condition. For process studies seek to offer complex accounts that highlight the importance of the ecology – the unfolding of particular circumstances in specific loci at a specific time (Shotter & Tsoukas, 2011; Tsoukas & Dooley, 2011).

By analysing specific cases, process scholars seek to identify family resemblances between particular cases and address the core issue of “how the particular and the general are related” (Tsoukas, 2009b, p. 286). Due to the singularity of particular cases, process studies necessarily need to draw new distinctions or recombine already established distinctions so as to elaborate on what is already known. Notice, that this is a creative process because “concepts are empirically undetermined” (ibid, p. 286) – the same situations can be interpreted in a plurality of ways depending on both onto-epistemological assumptions (Dreyfus & Taylor, 2015), and which aspects of the relationship between the particular and general are focused on. The goal of process studies, then, is not generalization, but analytical finesse. Although not necessary, analytical finesse can complement the insights of large-scale quantitative studies (Tsoukas, 2009b, p. 286). Hence, it would be undesirable for process studies to imitate the logic of large-scale studies.

Nevertheless the insights of this study need to be appropriately theorized in the light of radically different organizational settings. In other words, the

findings about the investigated ATC unit have certain idiosyncrasies that need to be taken into consideration on the occasion that the advocated theoretical framework is used to interpret other settings. The studied setting is heavily regulated. All activities are tied to written guidelines. Knowledge of the latter makes it clear when the staff engages in improvisation. The latter may not be so easy to identify in settings which do not have formalized rules. In addition, due to the narrow time-frames in which the organization operates, there is increased pressure for its staff to deal with exigencies within seconds of arising. This may not often be the case in more bureaucratic organizational settings, which in turn may give rise to other practices of improvisation.

Despite the idiosyncrasies of the theoretical framework, with its emphasis on concern about internal goods and skilfulness, has features that may hold across a wide number of settings. If we assume that all settings house practices, then we can assume that they are underlain by internal goods that guide their activities. While the internal goods are not likely to be the same across practices, they nevertheless should form the basis of what is of concern (MacIntyre, 2007; Moore, 2017; Nicolini & Monteiro, 2017; Schatzki, 1997). By extension, learning to be concerned about something is likely to cultivate emotional reactions to situations that offer motivation for crafting responses (Dreyfus, 1991; Frijda et al., 2014; Solomon, 2007). However, the intensity of emotional reactions may vary depending on the nature of the setting. Moreover, if we assume that the execution of all activities require the development of skill (Dreyfus, 2017b; Dreyfus & Dreyfus, 2005; Ribeiro, 2014, 2017; Ribeiro & Lima, 2016; Tsoukas, 2011a), then circumspection is also likely to be observed across settings. The differences will be in the object of anticipation, the particulars in which practitioners dwell in and the elements the agents find unusual. What is increasingly likely to be different, is that there are additional improvisation practices in other settings.

Past research has highlighted that organizational improvisation does not always entail positive outcomes (Giustiniano et al., 2016). Thus, it must be emphasized that this study has not explored the “dark side” of organizational

improvisation (ibid.). The main reason for the latter is because this study had a different focus. In particular, this study sought to contribute to the literature by offering an explanation of how improvisation is enacted and experienced, rather than judging the outcomes of improvisation. The latter, like many other aspects that this study has not focused on, such as the relationship between improvisation with narratives and artificial intelligence, need to be addressed in future research.

6.9 Directions for Future Research

While the present study has attempted to push the frontiers of understanding improvisation, by focusing on the experience of improvisation and its enaction, there are aspects of the phenomenon that this study has not addressed and still require further research. In the next paragraphs questions remaining broadly unanswered will be outlined.

Previous improvisations are often narrated as war stories between agents. Narratives often contribute to agents' identities and incorporate values (see A. D. Brown, Gabriel, & Gherardi, 2009; Gabriel, 1995; Tsoukas & Hatch, 2001). Thus, how do narratives of past improvisations affect the identity of agents? Which types of improvisation are more frequently narrated and how does that affect the propensity of further improvisations? How are narratives of improvisation tied to the values of organizations (see Cunha et al., 2015, p. 524)?

Moreover, during the last decade many aspects of organizations are being automated through the introduction of artificial intelligence (AI) (see von Krogh, 2018). AI offers agents a new set of affordances, while perhaps making existing affordances redundant (e.g., Beane & Orlikowski, 2015). Therefore, how agents perceive ways to improvise is changing. This suggests that AI may have opened up new improvisation practices, but also closed existing ones. Despite technological changes to the workplace we know very little about how AI is affecting improvisation in organizations. Hence questions that could be

addressed in the future are: how is AI affecting improvisation practices? How does AI facilitate improvisation? How does AI impede improvisation? Is AI more suitable for specific practices of improvisation rather than others? How does AI change the perception of solicitations?

In addition, it has been highlighted that improvisation does not inherently entail positive outcomes; there are instances in which it has negative outcomes, especially when it involves deviations from organizational procedures (e.g., Costa Concordia) (Giustiniano et al., 2016). Hence, understanding the antecedents and the processes that give rise to improvisation having negative outcomes needs to be better understood. For example, is a negative outcome of improvisation more likely to occur when agents are inexperienced (e.g., like when Tom, in Episode 2, could not anticipate that the pilot was experiencing problems)? Are negative outcomes of improvisation more likely to occur in practices that have many competing internal goods (because agents may not be able to hierarchise which good takes priority)?

CHAPTER 7: CONCLUSION

“All try their hands at miming, at repeating, and at re-creating the reality that is theirs. We always end up by having the appearance of our truths.”
Albert Camus (1979, p. 87)

“One cannot step twice into the same river, for the water into which you first stepped has flowed on”
Heraclitus (in Davenport, 1995, §21)

Organizations are created on the basis of coordinating the labours of individuals through conventions (viz., rules, procedures, routines) (Gkeredakis, 2014). With immersion in organizational practices, agents learn to tacitly dwell in normative distinctions (e.g., concepts, terminology, goods/values). Over time agents take the latter for granted to such an extent, that it becomes a gestalt against which they concernfully appraise their anticipations of unfolding developments. However, insofar as conventions draw upon Practices, they are necessarily forged out of past experience, but must be extrapolated to new circumstances. Thus, conventions constantly need adjustment to fit anticipated contingencies. This is because the social world is an open-ended system, wherein encountered situations are unlikely to be identical (Hadjimichael, 2017).

Following from the above, agents are called to attempt to re-align situational exigencies with what is conventionally held to be good (see MacIntyre, 2007; Moore, 2017). This study has attempted to complement the existing literature on organizational improvisation by paying particular attention to how improvisation is experienced and enacted. Specifically, I have argued that improvisation is achieved by being drawn to improvisation practices through circumspection. By doing so I hoped to illustrate that coping with the sociomaterial world is a complex phenomenon that is tempered by skills as well as emotional predispositions that are developed on the background of experience in Practices.

In parallel, I hoped to show that organizational improvisation is an ever-unfolding process. This is because the novelty of situations create a recurring loop wherein agents are habitually predisposed to appraise their anticipation of developments by attending from their concerns and past experience. Appraisal solicits agents to respond through relevant affordances that address their concerns. If agents lack an anticipation due to unfamiliarity, they reflect in or on the situation to restore their anticipation. The latter restarts the cycle of circumspection. It follows, that every response evokes new anticipations, concerns and appraisals, and hence, new solicitations to responses *ad infinitum*. Because this loop is ever-unfolding, improvisation is and will be an inherent feature of organizations.

In the “Myth of Sisyphus”, Camus (1979, p. 87) aptly noted that “all try their hands at miming, at repeating, and at re-creating the reality that is theirs. We always end up by having the appearance of our truths”. If I may interpret Camus’ passage through the lens of this study, it implies that agents learn to enact Practices by imitating and repeating the actions of their peers. This entails an implicit attempt to constantly re-create the sociomaterial reality they have learned to value. However, much like how Heraclitus (in Davenport, 1995, §21) maintains that a person “cannot step twice into the same river”, situational uniqueness never allows agents to enter the same situation twice. Hence, as Sisyphus, who was condemned by the gods to eternally push a rock up a steep hill; when situations unfold in ways that do not concur with the “oughtness” of Practice (Schatzki, 1996, p. 101), agents are condemned, if they value them, to attempt to re-align them through improvisation. While the temptation to continue to push the rock uphill unreflectively may be great, it is not the only way to enact our Fate. Careful reflection on our experience may not free us from our Fate, but at least it may assist in understanding the means and the meaning of continuing to push our rock onwards.

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Glossary Appendix

A. Equipment in Air Traffic Control

A vast range of equipment is used by the ATC team at the aerodrome. A brief explanation of each is offered:

1. Aircraft Stands: Designated area of an apron (see 2) where an aircraft can park.
2. Airport Apron: Where aircrafts are parked, unloaded, loaded, refuelled, boarded or disembarked.
3. Airway: Pre-defined route that connects two locations at specific altitudes. The route is specified in reference to pre-specified points (viz. waypoints - see 25) that can be identified by GPS (see 18) or from ground beacons such as the VOR (see 24).
4. Area Navigation (RNAV): Instead of aircraft navigating directly from beacon to beacon (see 24), RNAV allows to choose any heading (see 33) between beacons. At the aerodrome studied it was used transition to the final approach to the runway (see 17) (Nolan, 2011, p. 75; D. Smith, 2015, p. 49).
5. Automatic Terminal Information Service (ATIS): Broadcasts from airports with most recent information regarding the weather, the active runway (see 17), the available approaches or Notice to Airmen (NOTAM) (see 12) (Nolan, 2011, p. 249).
6. Disconnection Points: Set points on taxi lanes (see 19) where tow trucks and aircrafts are disconnected from each other.
7. Distance Measuring Equipment (DME): Radio navigation system, usually collocated with VOR (see 24). Allows pilots and controllers know the distance of an aircraft from a ground beacon. The combination of VOR (see 24) and DME provide an accurate position fix for an aircraft (Nolan, 2011, pp. 70–72; D. Smith, 2015, p. 44).

8. Flight Plans: Standardised method for providing ATC units with information about the routing of flights. It is transmitted via worldwide system of aeronautical network (Nolan, 2011, p. 418).
9. Flight Progress Strips: Small narrow rectangular strips of paper. Used as representation of a flight and assist in keeping track of it. Carries information about an aircraft's flight plan (see 8), call sign (see 29), type, flight level (see 27), route, destination, true air speed and has space for ATCOs to make annotations (D. Smith, 2015, p. 52). Annotations are vital as they serve as a means of remembering the instructions issued to each aircraft e.g. flight level given (see 27), taxi instructions (see 20) (Nolan, 2011, p. 280). Each strip is placed in a coloured plastic strip holder which is then placed on the strip-holder board. The colour of the strip and its position on the strip-holder offer information about aircraft position. Blue represents west-bound flights and yellow represents east-bound flights. Flight progress strips are considered to be official documents and can be used for investigations (Nolan, 2011, p. 286). The layout of the strip-holder varies depending on the role of the person sitting in each work station (see figure).
10. Frequency Assignments: Pilots and controllers use one specific frequency to communicate with each other. Based on international agreements only certain radio frequencies are used for aviation communications. Specifically, very high (VHF) and ultra-high (UHF) frequency bands are used because they are suitable for communication over large distances and follow the curvature of the earth. The following blocks of frequencies are used by ATC: 118.000 - 121.400, 123.675-128.800 and 132.025 -136.975.
11. Instrument Landing System (ILS): Radio navigation system, usually collocated with VOR (see 24) and DME (see 7) systems. Used by pilots immediately before and during landing, to continually determine the position of their aircraft relative to the runway (see 17) in order to be aligned with its centreline (Nolan, 2011, p. 102; D. Smith, 2015, p. 45).

12. Notice to Airmen (NOTAM): Notice broadcasted via telecommunications which shares information about service conditions or hazards that are essential knowledge for anyone engaged in flight operations. It specifies a physical location and duration of a restriction. It is updated by ACTAs (Nolan, 2011, p. 185).
13. Pushback: When an aircraft is parked on a stand, it needs to be pushed back from the stand (see 1) to the taxi lane (see 19) by using a tow truck.
14. Radar: In combination with computer technology, by sending and receiving signals to aircrafts this system allows to produce a picture of the aircraft moving in the airspace. It produces a radar position symbol (aka “blip”) on a monitor. Next to each blip, the monitor displays call-sign (see 29), flight level (see 27) and direction of aircraft (Nolan, 2011, p. 360; D. Smith, 2015, p. 54).
15. Radio-telecommunication: Communication over radio frequencies is predominantly used for ATC. Each active controller is assigned at least one frequency(see 10) to communicate with pilots. In addition to the radio, each controller has access to a landline telephone to communicate with other services. Communication channels are integrated to allow seamless communication. A switching panel is used to choose with whom to communicate. Controllers were equipped with a headset and a boom microphone (for back-up) from which they could talk on the phone or the radio (Nolan, 2011, pp. 194–195).
16. Runway Lighting: Edge lighting, threshold lighting and runway end lighting define the extent of the runway (see 17) and are necessary for night use. Stop way lighting is used in a similar manner to traffic lights at important junctions [e.g. taxiway (see 21) to runway (see 17)]. When they are red no aircrafts can traverse beyond them, when green they can – their colour is adjusted by the Approach/Tower ATCOs. Intensity for all can be adjusted by the Approach/Tower ATCOs (Nolan, 2011, pp. 123–136).
17. Runway: Rectangular area used for aircraft landing or take off.

18. Satellite Navigation (GPS): Geo-spatial positioning system by using satellites. They are the most accurate location systems. Gradually being introduced to aviation to help determine aircraft positions (Nolan, 2011, pp. 84–86; D. Smith, 2015, p. 47).
19. Taxi lane: Taxiway that offers access to aircraft stands (see 1).
20. Taxi: Movement of aircraft on the ground to and from the runway (see 17).
21. Taxiway: Route used to travel to and from the runway (see 17).
22. Traffic Alert Collision Avoidance System (TCAS): Reacts to transponders (see 23) of aircrafts to reduce air collisions between aircrafts. Offers warning to pilots and controllers, independently from ATC (Nolan, 2011, pp. 358–359). If TCAS are activated, an investigation by ATCOs is mandatory to find the reason for why aircraft separation (see 26) was violated. TCAS alerts are not issued when flying at low altitudes (see 27) (D. Smith, 2015, p. 19).
23. Transponder: Transmitter on aircraft that receives radar signals (see 14) and broadcasts information in reply (D. Smith, 2015, p. 50).
24. VHF Omni Directional Range (VOR): Radio navigation system for aircraft that operates from fixed ground radio beacons which gives accurate directional information. It broadcasts differentiated signals to allow pilots and controllers, to decipher aircraft direction in relation to the beacons (Nolan, 2011, pp. 60–72; D. Smith, 2015, p. 44).
25. Waypoint: Pre-specified points in the air that are part of an airway (see 3), are referred to as waypoints. An airway (see 3) has several waypoints. Waypoints are named with five letter words which are easy to pronounce, used to standardise coordination with pilots.

B. Air Traffic Control Rules and Terminology

To ensure safety and expedition, ATC depends on the strict implementation of rules and the use of standardised terminology to do so. Definitions of key terms will be provided in this section.

26. Aircraft Separation: Aircraft separation refers to keeping aircrafts at a safe distance from each other. The minimum distance between IFR aircrafts (see 35) allowed at the studied unit was approximately 5 to 8 miles laterally and 1000ft vertically (up to flight level 290, above this level vertical separation is doubled to 2000ft with certain exceptions). For VFR (see 46) aircrafts separations are approximately 1 mile horizontally and 1000ft vertically.
27. Altitude Vs Flight Level: Altitude is how high the plane is flying from mean sea level by taking into consideration QNH (local pressure), whereas flight level is how high the plane is flying from mean sea level by considering QNE (pressure altitude). Altitude is used for low levels whereas flight level is used for high levels (Nolan, 2011, p. 199).
28. Approaches: When aircrafts were flying in the FIR, the controllers of the latter would instruct aircrafts to contact the control tower approximately 40 miles from the airport to receive approach clearance. Under normal conditions, pilots cannot begin their approach to the airport if they do not receive clearance to approach (see 30) from the control tower. Depending on the direction an aircraft is coming from (West, East, North or South), there are pre-specified airways (see 3) which they must follow to approach the airport. The airways (see 3) pre-specify the route from which an aircraft can approach and the minimum altitude (see 27) an aircraft can reach at the waypoints (see 25) of the route by taking into consideration the terrain and other airways.
29. Call sign: Unique alias of a transmitting agent. Permits unambiguous identification of sender and receiver of message (see also 36).
30. Clearance: Authorisation issued by an ATCO to a pilot to proceed to certain point. Clearances are issued in different phases of a flight. They include clearance to taxi (see 20), to take off, land, to use an instrument approach procedure (see 34), to proceed to an airport or navigational fix (see 25) (Nolan, 2011, Chapter 205; D. Smith, 2015, pp. 33–35).

31. Departure Clearance: All departing aircrafts are issued with an initial route which leads to the airway that takes the aircraft to its new destination (see also 3). ATCOs would instruct aircrafts to contact the FIR approximately 10 miles out from the airport.
32. Flying height assignment: All aircrafts are assigned a specific altitude or flight level at which they must fly. IFR pilots (see 35) must maintain and request permission to change, whereas VFR (see 46) pilots may deviate to maintain visual contact with landmarks although they must inform the ATCO.
33. Headings: Aircraft direction in reference to the magnetic north (Nolan, 2011, p. 201).
34. Instrument Approaches: After following the approach (see 28), around 16 nautical miles from the airport, aircrafts must get further clearance (see 30) to use the instrument approach. An instrument approach is a predetermined route an aircraft must follow to land and is aided by instruments such as the ILS (see 11), VOR (see 24) or GPS (see 18). Depending on the direction from which the aircraft is approaching there are different instrument approaches that can be chosen from.
35. Instrument Flight Rules (IFR): Set of rules when aircrafts navigated with reference to instrument indications.
36. Message Format: To minimise miscommunication between pilots or controllers, a standardised message format procedure is specified. Each message follows the below structure (Nolan, 2011, p. 195):
- a. *Sender identification of Receiver*: Agent making contact must specify the identity of who they are contacting (usually the call sign - see 29) to prepare the receiver that a transmission is to be made.
 - b. *Sender Self-identification*: Agent making contact must then specify their identity (usually the call sign - see 29) to inform receiver who is trying to contact them.

- c. *Message*: Message content specified in relation to aviation terminology and pronunciation (see 38).
- d. *Termination*: When terminating a message, operating initials (usually the call sign - see 29) should be specified at the end of the transmission.

37. Minimum Altitude: For VFR (see 46), over inhabited areas 1000ft over ground/terrain or highest obstacle but elsewhere 500ft over ground/water or highest obstacle. For IFR (see 35), over inhabited areas 1500ft, but elsewhere 1000ft over highest obstacle or minimum specified by the procedure used each time.

38. Pronunciation of Alphabet and Numbers: Communication between ATC and aircrafts is heavily reliant on radio-telecommunications. To minimise misunderstandings international agreements dictate that aviation professionals use a standard phonetic alphabet. Pronunciation of letters is stipulated in Table 9 (Nolan, 2011, p. 196):

TABLE 9
Phonetic Alphabet in use in Aviation

A - Alpha	J - Juliet	S - Sierra
B - Bravo	K - Kilo	T - Tango
C - Charlie	L - Lima	U - Uniform
D - Delta	M - Mike	V - Victor
E - Echo	N - November	W - Whiskey
F - Foxtrot	O - Oscar	X - X-Ray
G - Golf	P - Papa	Y - Yankee
H - Hotel	Q - Quebec	Z - Zulu
I - India	R - Romeo	

For the same reasons, the pronunciation of numbers is standardised. Each number should be pronounced individually see Table 10 (Nolan, 2011, pp. 195–196; D. Smith, 2015, p. 25).

TABLE 10
Number Transmission in Aviation

0 - Zero	6 - Six
1 - Wun	7 - Seven
2 - Too	8 - Ait
3 - Tree	9 - Niner
4 - Fower	10 - Wun Zero
5 - Fife	569 - Fife Six Niner

When pronouncing altitudes (see 27), thousands must be pronounced separately from hundreds. E.g., altitude of 5100 is supposed to be pronounced as fife tousand, wun hundred.

39. Read back: When an ATCO issues a pilot with an instruction, the pilot must repeat the instruction. This is a way to ensure that the pilot has understood the instruction. In cases that the pilot erroneously reads back, the ATCO repeats the correct instruction and the pilot is again required to repeat. This process continues until the pilot correctly repeats the instructions.
40. Reports: An ATCO may request that a pilot reports their position, altitude or flight level (see 27), speed and intentions.
41. Runway Numbers: Runways (see 17) are numbered in reference to their relation to the magnetic north heading e.g. in the observed airport the runway names were 27 and 09 (Nolan, 2011, p. 201).
42. Speed: Aircraft speeds are measured in knots.
43. Squawk: aircraft transponders are assigned a four-digit code by ATCOs, to broadcast in response to radars. It is a secondary way of identifying an aircraft's identity on the radar (see 14).
44. Time: To ensure safety and coordination, it was specified with international agreements that ATC systems should not use local time. Instead, it was agreed that all ATC stations must use UTC - local time in Greenwich, England (Nolan, 2011, p. 198).

45. Visual Approaches: Like instrument approaches (see 34), when close to the aerodrome a pilot may request a visual approach. A visual approach does not rely on instruments to land, but on a pilot's ability to proceed to the runway (see 17) with visual reference. They are usually chosen by experienced pilots, or pilots that are very familiar with the airport. The benefit of visual approaches is that they usually reduce approach time for pilots and therefore, can help ATCOs to increase the expedition of traffic flow.
46. Visual Flight Rules (VFR): Set of rules when aircrafts navigated with reference to visual landmarks. Specifically, VFR minimum requirements for flight approval are: (i) 8km visibility, (ii) no clouds below 1000ft and (iii) no warning or expectation of weather below aforementioned minima. A VFR is limited to reach a maximum height of 8000ft.

C. Air Traffic Control Contingency Procedures

47. Altitude Change: Depending on the circumstances an ATCO can request that an aircraft changes its altitude (see 27).
48. Flight Regulation: ATCOs at the aerodrome may request that the FIR region caps the number of flights to approach the airport to a maximum of 12 per hour in order to cope with traffic.
49. Holding Instructions (aka 'hold'): Depending on the circumstances an ATCO can request that an aircraft enter a holding pattern. A holding pattern specifies that an aircraft must enter a predefined oval pattern over the specified waypoint (see 25) at a specified altitude. Usually used to delay an aircraft. The standard hold is based on right-hand and usually takes 4 minutes to complete (1 minute for each side of the oval). However, more ad-hoc holds may be requested by ATCOs - these are referred to as 360 degree orbits. They are not required to be over a waypoint (see 25) and usually only take 2 minutes to complete - the only requirement is for the pilot to have visual reference with the ground.

50. Missed Approach Procedure (aka 'Go around'): In case a safe landing cannot be completed, the ATCO can request that a pilot 'goes around' or the pilot can initiate a 'go around' after informing the ATCO. In the case of a go around, the aircraft must follow a pre-specified route at 2000ft (and altitude - see 27) that leads to a waypoint (see 25) that can be used to re-initiate the approach. The altitude (see 27) used is separated from other routes so as to ensure safety.
51. Speed Adjustment: Depending on the circumstances an ATCO can request that an aircraft increase or decrease their speed in order to maintain appropriate spacing with other aircraft (see 26).
52. Touch and go: When an aircraft lands and immediately after takes off. Usually used as a way for pilots to gain experience in take-off and landings. However, can be used in emergencies too. In the latter case, the pilot must navigate in line with the missed approach procedure (see 50).

Appendix 1: Further Examples of Improvisation

Mundane Instances of Improvisation

- 1) Constant adjustments to aircraft speed, altitude and approach method were observed constantly. The higher the traffic, the more likely the control was to tinker with all three. I would witness this hundreds of times each day.
- 2) A controller instructed an aircraft to deviate from the normal procedure while departing the airport in order to offer a shortcut by avoiding two inbound aircrafts. This type of improvisation was frequent, but tended to be used by experienced controllers when dealing with high levels of traffic. I would witness this about three times a day.
- 3) A controller instructs an aircraft to perform an ad-hoc orbit to their right in order to delay its arrival due to being too close to a preceding aircraft. While this response is not preferred, I had witnessed its use 44 times.
- 4) A controller instructs an aircraft to use an unconventional taxi route to save time after a navigating mistake by the pilot. This type was used whenever a pilot would make a mistake. On average I would witness this thrice a week.
- 5) A controller instructs an aircraft to use an alternative to the designated taxi route from the aprons to the runway. This tended to happen during low levels of traffic to save the aircraft some time. I would witness this dozens of times a day.

Critical Instances of Improvisation

- 1) An inexperienced ATCO froze in panic upon noticing that a pilot was mistakenly taking off. The reason for panic was due to another smaller aircraft also being on the runway at the time. A collision was imminent. An experienced controller, who was on a lunchbreak, noticed this and immediately took over control. He asked the pilot, who had mistakenly started to take off to hold their position immediately.
- 2) An aircraft was hijacked and the hijacker requested to land at the airport. The controllers on duty had to contact the authorities and adjust flight schedules. No other aircrafts were allowed to land or depart until the incident was dealt with. The controllers had to then collaborate with the negotiation team.
- 3) During a break an air traffic controller notices smoke coming from a parked aircraft. Immediately notifies colleagues, who in turn notify the police service and ensure no other aircraft are allowed to park near it until the incident is resolved.
- 4) Light aircraft told to hold short of taxiway Charlie, because airliner was taxiing towards holding point Alpha. The pilot of the former did not comply and entered Charlie. Controller spontaneously instructs the airliner pilot to hold position, because they tend to be more reliable.

- 5) As aircraft was approaching to land, it reported a bird strike. The controller in charge had to put other inbound aircrafts in holds, while delaying departures until runway was inspected.

Appendix 2: Additional Evidence for Internal Goods

Safety

- 1) **Mike:** “When something goes wrong the only concern you have at that time is to avoid the collision, to save lives. You become focused on two things, the distressed parties and the others - aircrafts are separated in your mind into these two categories like BAMB... when you realise the imminent danger you act erm instinctively and after its dealt with, then it gets you, that’s when you get more stressed and you ask yourself what just happened...Safety is everything, safety is number one, safety is tied to everything. When you are being safe you are being proper at your work and then a calmness comes and everything feels smooth”
- 2) **Chris:** [Recounting reaction upon realising that a pilot made a mistake and was on a collision course with another aircraft]: “...when I realised what had happened, it was excruciating, like an electric shock. Immediately, erm in inverted commas, I became fully alert and blocked everything else out, and it was as if the others didn’t exist (aircrafts not in danger), theoretically so to speak. I immediately told the first aircraft to... as soon as I had disentangled the situation I felt relieved, it was as if a weight from my shoulders was removed - but until it was over and dealt with it was terrible, I was trembling...after that I am much more careful, I try not to rush into things - it doesn’t matter if it’s not expeditious, safety is the priority because pilots don’t always follow your instructions, it’s better to be safe than sorry”.
- 3) **Harry:** “ATC is about safety above all. Safety is first and expedition is second - these are the key objectives of ATC. Both objectives have their unique qualities. But when something goes wrong, expedition is pushed aside because safety is above all. When the difficult time comes only one thing matters – SAFETY” (emphatically).
- 4) **Observations:** Annually the SATCO arranges two full-days of training sessions on safety. It is mandatory for all personnel to attend. Throughout the event, speakers are invited to talk about matters related to safely executing their job. In his opening speech, he asserted: “... *ensuring the safety of flights is the raison d’etre of our profession*”

Expedition

- 1) **Leonard:** [on training] “The instructors tried to make us focused on being a controller by listening and writing at the same time and looking outside the window. They used specific scenarios which pressured you, especially in the first sessions, to learn the basic operations of the controller - multifunctioning and being expeditious by constantly using the runway”.

- 2) Norman: [During training] “we did simple things like having one or two arrivals and a departure. To be safe, I allowed both aircrafts to land before allowing the departure to leave. After the session, the trainer reprimanded for not ensuring the expedition of all flights. You see, I could have allowed the departure to leave but I didn’t.”
- 3) Andrew: instructed an aircraft to deviate from the normal procedure while departing the airport in order to be clear of two arrivals. He explained that: “it was just instinct, I felt that instead of making 10 different calls to separate them and not to mention increasing the risk of an error, I managed to handle the situation expeditiously - my instruction saved time for the departure and didn’t interfere with anyone’s safety.”
- 4) Observations: A frequent occurrence when ATCOs were fulfilling the ground control position, was to help aircrafts taxi to the runway 27 from apron 1 quicker than usual by deviating from their handbooks normal taxi routine (Lima - Zulu - Charlie to Alpha). When they were sure no arrivals were imminently at hand they would instruct, aircrafts leaving from taxi lanes Lima Alpha or Lima Bravo to taxi to Alpha via Victor - Charlie or when from taxi lane Lima Charlie to taxi to Alpha via Whiskey then Charlie. As several controllers explained to me, it is easier and faster for pilots this way because the extra turn at Zulu is alleviated with these instructions. Experienced ATCOs would reprimand inexperienced ATCOs for “*inconveniencing the pilots*” if they forced aircrafts to taxi the long route when there was no traffic.

Appendix 3: Additional Evidence for Mood

Attentive calmness

- 1) Paul: “The experienced personnel must help the newbies - to give them their knowledge about how to deal with emergencies and pilots in distress: for example, how to talk on the radio - let the pilots relax, talk to them slowly, say your instruction again if you must. Pay attention to the tone of your voice, you shouldn’t demand things; you should be thoughtful, for example to say to the pilot: when you are ready tell me how many people are on board, how much fuel etc.”
- 2) Constance: from training, we were taught to be professionals - that it’s better to reply in the politest manner and keep a low profile even in cases in which pilots may provoke us... We are here to cooperate with the pilots, firstly for safety and then for expedition...our job is to help airplanes, to facilitate them for safety so we shouldn’t get angry or stressed... In case of an emergency, help the pilot by making as little calls as possible during an emergency. Ask them if they need help, if they say no just keep an eye on them but don’t badger them. You must remember to keep your voice calm - you are not the one in danger, the pilot is.
- 3) Leonard: “Once they let you know that they are in trouble, I won’t get stressed. My voice won’t break, it shouldn’t show signs of trembling because I know that I am not the one in danger. It really matters that you listen to the pilot, you can understand that they are under pressure, sometimes you can hear the other pilot shouting. If their voice is cracking up even if they don’t declare an emergency, you should give them priority... adapt your plan and your voice make it more comforting and reassuring. Although I said earlier you have to be firm with pilots, if you realise that the pilot is not well, you shouldn’t be strict with them. I will talk to him sweetly, slowly slowly and try to make them understand that I am are there for them. Even if they are not reading back everything, you shouldn’t have a fit and start demanding things, you have to find another way.”
- 4) Harry: “no one can have a heart of stone, but whatever you are feeling, you must be professional and sound as if you are calm. You may be feeling negative emotions; your heartrate may be skyrocketing because you are thinking about the worst-case scenario - losing 200 lives - but you can’t let that overpower you; you have to put it to one side and do your job - you can’t do anything else”.

Appendix 4: Additional Evidence for Conforming through Accountability

- 1) Paul: “You feel a huge responsibility, you can’t do something just because you want to, you can either do it the way it should be done, or you should prepare to answer for not... it’s not something we take lightly, we are in charge of taking care of hundreds of lives and millions of euros... You learn there are rules, but when an aircraft says mayday, mayday you can bend the rules. But when you go to court you must have a really good reason to bend the rules. You can’t bend the rules without a reason. A good reason to bend them is because you didn’t have another choice. But you must prove that with real evidence. One of the reasons a pilot gives you a mayday is to give you this flexibility. You can do things such as interrupt routine procedures or sequencing just because a pilot said mayday. But always remember that the insurance companies won’t let you get away with it - they’ve insured airliners for hundreds of millions and they don’t want to lose a penny, so you should go by the book as much as possible.”
- 2) Mike: “The responsibility can take a toll on you if you let it. In the beginning or whenever I used to make a mistake I got scared, scared I would think I have three planes now (sighs) 700 people if it’s a jumbo 900 people and I used to keep thinking about it...but you can’t keep thinking about this, you can’t do your work like that...I had a colleague that became obsessed by the sense of responsibility she felt after a near miss. She had made a mistake and the aircrafts were saved thanks to luck. After that, each time she did a session she would have her phone next to her and record what she said and heard, so she could go back and listen to what happened and understand what went wrong. Even when nothing went wrong she would still listen to the recordings. You can become paranoid, it can wear you down, wear you down. I know you see us joking and laughing but we always have this in the back at the back of our head.”
- 3) Pauline remembers that she felt responsible for asking a pilot to use the missed approach procedure at the last minute. In fact, she felt so bad that she went to talk to the pilots to say that she “*would understand if they wanted to file a report.*”
- 4) Observations
 - a) Daily logbooks kept by the shift leader mention all unusual incidents. These are always reviewed by the Senior ATCO who in turn may investigate each occasion if deemed necessary.
 - b) For all unexpected incidents controllers are required to fill a report for the safety department to investigate. Even unidentified reports are encouraged when a controller feels that there is a problem that is potentially dangerous.